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The Case Against Bare Feet

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EVERYONE is familiar with the barefooted machine tender. No one knows when he received his start; he has been in the industry as long as any of us can remember. Many present day superintendents once enjoyed the same close contact with the floor of the machine room. There was no real objection to it before safety work was started in the industry. Now the point of view has changed!

The passage of the workman's compensation laws has changed conditions. The expression, "an accident," covers a much wider and larger scope than before. Minor bruises and lacerations were formerly a part of the game; the employee who received them continued work if he were able to with but little thought at the moment of what may happen later. If an infection or other cause of disability developed, the laws provided a measure of recompense but not the extensive and ready relief that exists at present. One of the best results of the present order of things is the difference in our attitude regarding accidents and the ready attention to preventive measures.

The first results of the operation of workmen's compensation laws brought an unpleasant reaction on the superintendent. Immediately every little bruise or cut became an accident, requiring attention. That was the superintendent's first realization of the number of times employees were being injured in the course of their work; it was hard for him to realize this as he could not believe that men who worked with him in the old days received anything like the same number of injuries. The conditions needed attention, and next to caring for injuries came steps to improve conditions and prevent a re-occurrence of the accidents.

But what has this to do with the present case? According to the memories of superintendents, barefooted men in paper machine rooms had very few foot injuries in the old days. Nowadays, when men are required to report injuries as soon as possible after their occurrence, reports of many minor injuries reached the superintendent. The total number of injuries will not ever be known, as the reported statistics do not include the many accidents which do not cause loss of time, or where no compensation is paid. Even though most of the accidents to bare-footed employees would come under this class, they should not be lightly disregarded because the accident possibilities are so great.

This is always an unsafe practice. Bare feet increase the chances of serious injury

The advocates of bare feet say that such a man

do his work better. The machine tenders are working constantly on wet surfaces, and that steps and platforms, especially at the wet end of the machine, can be easier traversed when men are not wearing shoes. It is claimed that barefooted men can step on bearings and other machine parts in an emergency and get a good foothold, which would be impossible if they wore shoes. When a sheet of paper

Slivers rarely pierce a foot when shoes are worn. The workman pictured above is very liable to receive an infection.

breaks, the machine tenders start for the break as fast as the athlete on the cinder path. There are many who claim that the barefooted man can get a sure start and get there faster than his leather-shod brother. Men who are sincere and persistent advocates of all safety measures will take the above arguments as their stand for bare feet.

On the other hand, what injuries do barefooted men experience? Lacerations, contusions, and fractures, of every part of the foot and leg. If anyone should observe the number of times that barefooted men are wearing bandages and adhesives holding dressings, the total would be surprisingly large. Barefooted men have stepped on sharp objects, such as hand tools, and have received very severe injuries. In a few instances, it is reported that men have stepped on oil cans, and the spout of the can has pierced the foot.

When a bare foot strikes any object, the result is certain to be a severe injury, more severe than if the man had worn a shoe. The shoe will give some protection even if the shoe is in poor condition. Bumping into or striking such objects as the machine frame, rolls of paper, truck wheels and truck frames, would be minimized by shoes, although the wearing of the shoe would not entirely prevent some discomfort and a bruise.

Among the things that shoes will absolutely prevent are slivers from wood floors and stone bruises from concrete floors. It is almost impossible to avoid slivers on matched wood floors where trucks are used, and there are very few paper machine rooms where trucks are not used. Even though the rolls of paper are handled by crane, trucks are needed for broke. The writer does not know of a single installation in machine room of wood blocks with the grain of the wood vertical, but trucks will damage these.

In wet locations in other industries, workmen wear rubber boots. This has never been practiced in paper mills in machine rooms and it is justly questionable from a standpoint of safety. The man on the street is familiar with the slippery surface of some concrete surfaces on rainy days when he is wearing rubber heels. The concrete floor in a machine room, or a wood floor which has been oiled, is as slippery, and it would be hazardous to wear rubber boots.

Any observer will see all of those things. To this must be added one complaint of the machine tender against shoes, which is that because they become soaking wet, they are uncomfortable to wear. This is a reasonable complaint indeed. The machine room superintendent will verify this, as he occasionally gets his shoes in the same condition.

The superintendent who is putting safety across, consistently reducing operating costs for the mill manager and endeavoring to care for the welfare of employees is requiring machine room employees to wear shoes nowadays. His argument is that *he* wears shoes all the time, *he* occasionally and sometimes for a long period of time wears soaking wet shoes, *he* goes up and down the steps and platforms at each press and *he* could get a good footing on machine parts; therefore why can't employees do this and avoid all these minor injuries to the feet? Stepping on broke poles and hand tools can be avoided if the housekeeping is good. A place can be made for everything and everything can be kept in place. Trucks can be so designed that there is a minimum possibility of injury when striking wheels or parts. Scuppers can be installed to drain off water. *Shoes can be worn!!!*

I Met a Rich Man

He has all the worldly goods he needs to keep him and his family happy and contented for the rest of their days, and there will be some left over. They live in a great stone house, with useful gardens, lawns, and grounds for tennis courts and the like.

He, his wife and children, and their friends, spend their week-ends on tramp trips, picnics, fishing trips, where they can wear old clothes and relax. They go to the mountains and get off at some wayside station, tramping eight or ten miles through the bush to reach a favorite stream. If night overtakes them they sleep in a barn or under the trees.

They have hosts of friends whom they visit and who visit them—there is no formality, they drop in when they feel like it. There is no show for show's sake. They are real people.

They have found happiness in simplicity, where all true happiness is.—Edward Dreier, in The Lombard News Letter.

Wood Preparing Equipment

By HARRY E. WESTON
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This is the second installment of Mr. Weston's article on Wood Preparing Equipment. The series will continue through a number of succeeding issues of this magazine.

Slasher System

THE slasher system was built primarily to economically reduce large quantities of logs of a nearly uniform length to blocks of a short uniform length and can naturally be operated to best advantage when the logs are cut in the woods to as nearly one uniform length as possible.

A slasher consists of an arrangement of one or more stationary saw arbors equipped with the ordinary types of circular saws mounted upon a slightly inclined table with feed chains so arranged on this table as to receive the logs automatically from a deck, carry them to and through the saws and deliver them cut at the back end of the slasher to a conveyor which is usually provided for removing them. Slashers are usually built to carry from one to eight saws, depending upon the length of logs being cut and also upon the number of pieces (bolts or blocks) to which it is desired to reduce them. Thus an eight saw slasher will cut an 18 foot log into nine 24 inch pieces. The cutting of logs into two foot blocks seems to be the prevailing practice.

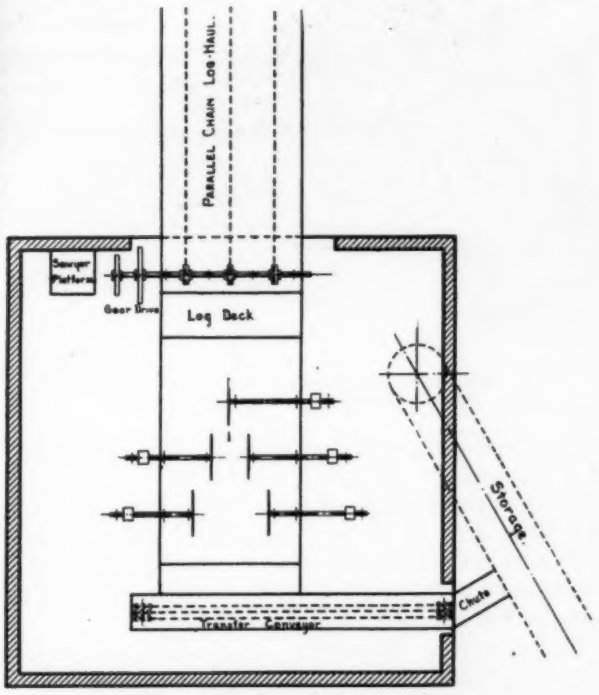
Courtesy—Canadian Ingersoll-Rand Co., Ltd.
A Slasher House Installation

The important parts of a slasher aside from the cut-off saws, may be enumerated as follows:

1. Framework.
2. Feed Chains.
3. Drive Arrangement.
4. Saw Arbors.
5. Saw Collars.

The framework of a slasher system may be of structural steel or timber. If the frame is to be of timber construction, Georgia pine, Douglas fir, Red pine, or any other suitable timber of sufficient size to withstand the rough work, may be used. The design of the frame will of necessity vary with the size and capacity of the slasher system.

The chains must be so located that they will pick up the logs at the front of the slasher, carry them to and through the saws and deliver them cut into the desired length at the back of the machine. They must also be so located as to permit easy removal of the saws. Generally the chains are a combination of semi-cast steel links joined by steel bar side links and riveted. The shape of the pockets formed by the combination of the long and short semi-cast steel links, as shown in the illustration *(Section of Feed Chain)* is of great importance, since it is necessary that the logs be held firmly in position to prevent cramping of the saws and to reduce the danger from flying blocks. The type of feed chain shown in previously mentioned figure will hold firmly in position a log of any diameter from four to twenty-four inches. Two lines of chain are used for each sawed piece resulting from the cut log. In this way the blocks are held securely throughout the cut and until they are automatically released at the back end of the machine.

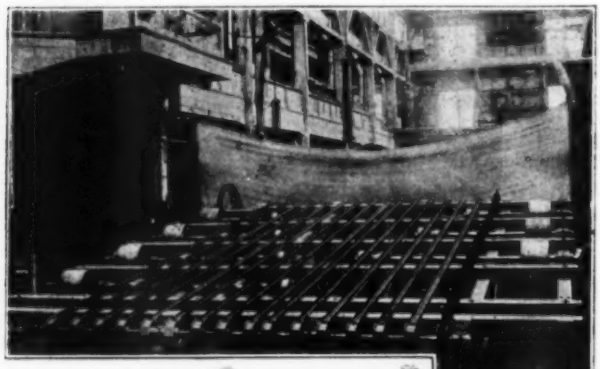


Plan of Five-Saw Slasher Installation

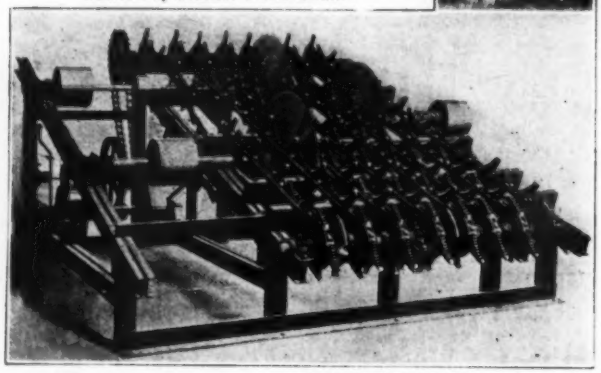
The feed chains should be smooth in action and

must be so built that the logs which they carry can be brought squarely against the saws. It is necessary that these chains be accurately built to templates to insure this condition. Each chain runs in a steel or cast iron trough which aids in keeping the chains straight and also insures long wear.

The driving arrangement of the feed chains may be subdivided into head shaft and sprockets. The driving sprockets are keyed to the head shaft which is in turn connected with reducing gears in such a way that the speed of the chains is about 25 feet per minute. The drive must be so arranged that these chains can be started or stopped instantly. Return idler sprockets are commonly used in installations carrying over six saws. Such a device relieves the driving sprockets of the weights of the long chains.



Courtesy—D. J. Murray Mfg. Co.
Section of Slasher Feed Chain



Courtesy—Waterous Engine Works Co., Ltd.
Above—Framework and Ironwork for Nine-Saw Slasher
Below—Three-Saw Pulpwood Slasher

Tail sprockets, attached to a tail shaft, guide the returning chains from the idler sprockets to the top of the slasher table. Their construction and arrangement is very similar to that of the tail shaft and sprockets of the parallel chain haul-up.

The drive for the slasher is usually in the basement of the Slasher House. A typical installation is shown in the accompanying illustration *(Cross Section of Slasher House)*. In this installation the main drive shaft is belt-connected to a motor of sufficient horsepower for operating the saws and feed chains. The saw arbors are in turn belt connected to the main drive shaft. In some cases, particularly in installations where there is no basement, the drive for the slasher may be arranged to come from overhead. The drive, no matter what its type, should be properly guarded to protect the workmen from injury.

The saw arbors are usually of $2\frac{1}{16}$ inch diameter steel with the combined qualities of strength and stiffness. Such pieces of equipment must be accurately made and the saw collars must be fitted with greatest care. The arbors should be attached to the slasher framework in such a way that the bearing surfaces can always be kept well oiled, and also maintain a permanent alignment of the arbors. The arbor pulleys should be well balanced and fitted securely to the arbors.

The saw collars, generally designed 10 inches in diameter for 60 inch saws, are usually of cast iron and contain a bored arbor hole and two lug pins. Two collars are used to completely fasten a saw—a tight collar and a loose collar. The tight collar is fitted against a slight shoulder turned on the saw arbor and is then shrunk on. The loose collar is used to clamp the saw against the tight collar. This arrangement must be designed so as to prevent any possibility of saws working loose while in operation, and at the same time to allow easy removal of the saws.

In multiple saw slasher installations, spreaders are so located that there is very little chance of logs binding in the process of cutting. The location of a spreader in a five-saw slasher installation is directly behind the first or leading saw. It is simply a wedge which separates sufficiently the two pieces, formed by the cutting of the log in half by the first saw, to prevent binding. A trimmer saw is sometimes installed at one side of the slasher table ahead of the leading saw to remove rotten or discolored ends of logs or to obtain an exact length of block. The ends of blocks cut by a trimmer saw are allowed to fall outside the machine.

The power required to operate a slasher will, of necessity, vary with different mills because of different working conditions. However, under average working conditions, 18 to 20 horsepower should be figured for each 60 inch saw.

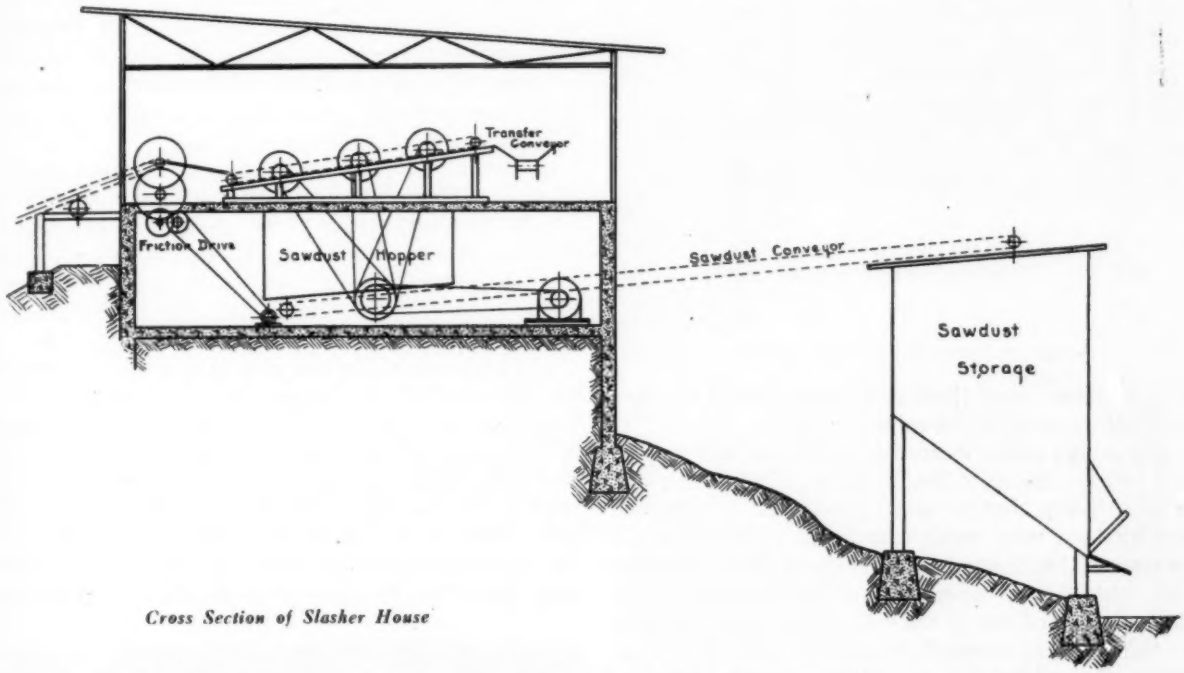
Some of the factors to be considered in the proper design of a slasher might be given as follows:

1. Shortest and longest length of logs to be cut.
2. Largest diameter of logs to be handled.
3. Length of short pieces into which the logs are to be cut.
4. Capacity—number of logs required to be cut in any definite period of time.

It is inadvisable to construct a slasher of this type where logs vary greatly in length since it would be

difficult to properly place such logs on the feed chains. In some installations where extremely long logs are used it is possible to employ a combination slasher and swing saw system. The logs are brought from the river or storage to the mill by a single chain haul-up where they are cut into suitable log lengths by means of the swing saw. The logs are then conveyed to the multiple saw slasher and are reduced to convenient lengths for easy handling in the remaining manufacturing operations.

The slasher type of equipment has much greater capacity than any other in use at present for cross-cutting logs. It is possible, in many plants, because of this capacity, to take the logs from the river, cut



Cross Section of Slasher House

them to the required lengths, and store them without the danger of loss from floods or the inconvenience due to the early approach of winter or the obstruction of a stream used for navigation. Many slashers operate only during the open season and by the time cold weather sets in a sufficient quantity of wood has been cut and stored to last until the opening of the streams the following spring.

Swing Saw System

The swing saw system has been designed to meet the needs of plants using extremely long logs or logs of varying lengths which would render the use of the slasher impracticable. A layout of such a system is brought out in the illustration *(Layout of Swing Saw System)*. The relative location of the log deck, log loader, live rolls, and saw and saw frame is shown. The logs are brought into the mill on a single chain log haul and are removed by mechanical means from the head end of the conveyor to an inclined deck from which they are taken for slashing as needed by the sawyer. The logs may be removed from the trough by men using peavies or by means of log kickers.

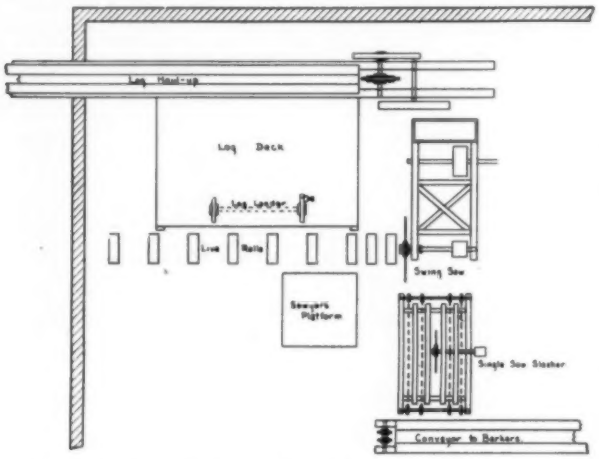
The usual form of log kicker consists of a rocker shaft to which is attached cast iron arms—the number of arms being dependent upon the length of logs being handled. A two armed machine with arms spaced 7½ feet apart on a 3½ inch shaft is used on logs of ordinary length. To these arms are attached shover arms. The shover arms are made up of two castings with heavy wrought iron riveted sides. These arms work through cast iron guide troughs located at the side of the conveyor trough.

The rocker shaft and arms are operated by means of a steam or air cylinder which is installed below the deck and attached to the shaft by a connecting rod. This connecting rod is controlled by either a foot tread or lever. The foot tread is used in most cases. This tread operates the cylinder and causes the logs to be thrown out of the trough onto the deck. The shover arms should be designed to strike the logs in such a way as to easily set them rolling down the inclined deck.

The log deck is of very solid construction. It is commonly built of timbers with railroad rails located upon the wooden deck so as to allow the logs to easily roll down the incline to the log stop or loader at its foot where they are held until needed by the sawyer. The deck should be of sufficient size to hold in reserve a considerable number of logs.

The usual type of log stop consists of two or more curved arms, keyed to a sufficiently strong shaft placed beneath the deck, parallel to the live rolls. The concave side of the curved arms is up and acts

as a cradle into which the logs roll and are held until needed by the sawyer. The live rolls are arranged to operate in series with the entire length of the train, being sufficient to accommodate the longest logs to be cut. The individual rolls are gear driven from a back line shaft extending the full length of the train. This back line shaft is driven from a main line or countershaft through a friction arrangement. The sawyer, likewise, has control of the live rolls and operates them so as to advance the log or logs



Layout of Typical Swing Saw Installation

to the gauge block through a lever which engages the friction to drive the rolls.

The gauge block, located at a distance beyond the saw to correspond to the length of block being cut, is of a heavy timber construction and is designed to withstand very rough treatment. This block can be seen in the illustration *(Overhead Type of Swing Saw Installation)* as can one of the curved arms of the log stop and one of the spiked live rolls. As soon as the logs are brought in contact with the gauge block, the friction driving the live rolls released and the logs stopped, the sawyer operates the saw frame bringing the saw through the logs until the completion of the cut or cuts.

Swing saw frames might be classified as "Overhead" and "Undercut." Wherever space and conditions permit, the overhead type is used. The frames are built of heavy timbers, arranged to swing from two vertical supporting timbers—one on either side and counterbalanced to move with a minimum of effort. Cast iron hinges connect the saw frame to the supporting beams. Steam or compressed air is used to operate the frame. This allows accurate control of the feed at all times so that the frame may be stopped, fed ahead, or reversed at any part of a cut. As soon as the cut is completed the feed lever is reversed, the saw brought back into position for another cut and the block automatically kicked from the gauge block.

A combination swing saw and single saw slasher outfit is operated in some of our mills. The gauge block of the swing saw is so placed that the saw cuts the log or logs into four foot lengths. The sawed blocks are then kicked onto the feed chains of a single saw slasher which carry them forward through the saw. In other cases, as mentioned previously, a swing saw is used to cut extremely long logs into lengths that can be handled by a multiple saw slasher and then the uniform length logs are passed through the slasher where they are reduced to blocks suitable for handling.

Cut-off Saws

Cut-off saws, because of their importance in the preparation of logs for wood pulp manufacture, require special consideration. They must be made from the best grade of steel and great care must be exercised throughout the manufacturing process. Saws are usually received at the mill from the manufacturers in good condition and it is very important for efficient operation that they be kept in this condition.

Both solid and inserted tooth saws are used as cut-off saws. The solid tooth saw is still preferred by a few, but several designs of inserted tooth saws found in many of our plants are giving satisfaction. The chief advantage claimed for the inserted tooth saw is the constant diameter of the saw and the ease with which new teeth are inserted into the plate.

The diameter of the saw should be more than twice the diameter of the largest log it is apt to be required to cut. Sixty inch diameter saws, six gauge in thickness, are commonly used for slashing. A log that is too large may infrequently have to be cut. In such a case the log is sawed part way through, the feed chain (if a slasher installation) stopped, and the log turned back into such a position by the workman that when it passes through the saw again the

"Overhead Type" of Swing Saw Installation

cut is completed. Such a method of turning the log might also be used in a swing saw installation. Sometimes the log is cut as far as possible with the saw and the remainder of the cut completed by one of the workmen with an axe before the log enters the next saw.

The gauge of the saw is determined by the work

that the saw has to do. The greater the speed and feed used the heavier the saw must be in order to stand up under the work. The Birmingham Wire Gauge (B.W.G.) is commonly used in such calculations. A six gauge (B.W.G.) saw would be .203 of an inch in thickness. *(See table.)*

The number of teeth in a given saw will depend upon the kind of timber being sawed, together with the feed. More teeth are required in high speed sawing as high feed is accompanied by great speed. The saw having the greater amount of work to do must have more teeth with which to do it. The additional teeth aid in distributing the strain. The following table, concerning saws of different diameters, was compiled from data received from a saw manufacturer:

Diameter Inches	Std. No. of Teeth — Solid Tooth	Inserted Tooth	Gauge — B.W.G.	Thousandths Inch	Millimeters
36	72- 80	60	9	.148	3.76
38	72- 80	62	9	.148	3.76
40	72- 90	66	9	.148	3.76
42	72- 90	70	8	.165	4.19
44	80- 90	74	8	.165	4.19
46	80- 90	78	8	.165	4.19
48	80-100	80	8	.165	4.19
50	80-100	84	7	.180	4.57
52	80-100	88	7	.180	4.57
54	90-100	92	7	.180	4.57
56	90-100	96	7	.180	4.57
58	90-120	98	7	.180	4.57
60	100-150	102	6	.203	5.18
62	100-150	106	6	.203	5.18
64	100-150	110	6	.203	5.18
66	100-150	114	6	.203	5.18
68	120-150	116	5	.220	5.59
70	120-150	120	5	.220	5.59

It is necessary that the saw teeth have proper spread and pitch for the wood which the saw is to cut. More set and less pitch are required in a saw that is to cut soft wood than in one that has to handle hard wood. Saw teeth must not be higher in back of the cutting point than at the point itself. If such is the case the saw will bind and heat on the rim. Great care must be taken in setting the teeth. *A good filer will save much in time and money in any mill where circular saws are used.* He can prevent many shutdowns and loss of time caused by the cracking of a circular cut-off saw. Bad filing is apt to cause a number of saws to crack during a single season.

A square corner at the base of a tooth, together with the bevel of the face being carried down into this corner weakens the saw. A few strokes with a round file at the base of the tooth after beveling the front will prevent the formation of a square corner from which a crack starts. The saw will likewise clear better if the bevel is carried only half way down the depth of the tooth.

The emery wheel, as employed in gumming and sharpening, must be properly used. If this is not done the points of the saw teeth become heated (blued) and the saw steel loses its toughness and tenacity. Oftentimes the teeth in such a saw will break off in the process of setting.

The hanging of a saw requires considerable care. The mandrel should be kept level and the saw, when placed and flanges screwed up, should be plumb. The saw ought not to bind on the mandrel or lug pins. The holes in the saw should be an easy fit on both the mandrel and pins, but ought not to be sufficiently large to allow the saw to slip on too readily. In all cases it is necessary to keep the saw collars in perfect shape.

The tension of a saw can be adjusted to overcome a slight variation in speed provided instructions are given to the manufacturers at the time of ordering. It is better, however, to operate at a regular speed at all times. The speed of the saw may be too high as well as too low. If the speed of the saw is too high it will not do good work and at the same time the saw becomes dangerous. Too high speed means a heating of the saw which makes it touchy and limber. Such a saw will only run and do good work on a light feed. Too low speed also has its objections but the effects are not as ruinous on the saw.

The following table was issued by the National Safety Council and covers the speed for circular saws corresponding to a rim velocity of 9,425 feet per minute.

Circular Saw Speeds

Diameter of Saw	R.P.M.
12 inch	3,000
14 inch	2,570
16 inch	2,245
18 inch	2,000
20 inch	1,800
22 inch	1,635
24 inch	1,500
26 inch	1,385
28 inch	1,285
30 inch	1,200
32 inch	1,120
34 inch	1,055
36 inch	1,000
60 inch	600
72 inch	500

Some manufacturers recommend somewhat higher speeds than here given. However, more than a 20 percent increase is inadvisable.

Cut-off saws do not ordinarily give trouble by overheating but a few causes might be given as follows:

Heating on the Rim

1. Not enough set in teeth.
2. Back of teeth too high.
3. Gum on teeth.
4. Not throat room enough for sawdust.

Heating at Center

1. Not enough set in teeth.
2. Mandrel runs too warm.
3. Saw too open in the body for the speed.

With proper care a saw will last several seasons. Logs must be placed correctly on the feed chains of a slasher to reduce all chances of the blocks binding

and at the same time to prevent small blocks from flying. If care is used by the sawyer and his assistants there is very little danger connected with slasher house operation. The control of the saws and the feed chains should be in charge of the sawyer at all times. Keen eyesight and quick judgment are necessary requirements for this type of work.

(*Continued in next issue.*)

Waste in the Pulp & Paper Industry

Waste in Groundwood Pulp Mills

By B. T. McBAIN
3rd Vice-Pres., Superintendents' Association

THERE are so many places in so many groundwood pulp mills where there is waste that no one should need to take the time to read a story on this subject, but just go into most any pulp mill and stand in the center of the room, close your eyes, swing around in a circle and then point somewhere, anywhere almost, and find waste.

I'll start with the method of handling wood from the wood pile if rossed or from the wood mill conveyor, if coming direct from the preparing plant.

Many mills use so called stackers. Here there is waste as against wood piled so the air can circulate through it and keep it from moulding and rotting. The cost of handling from the stacker pile in winter is greater than when piled so that transfer to a wood truck or car can be more readily done.

To allow bark to follow the wood from wood mill to stacker and to pile up with the wood causes loss and waste, not only because of making the wood more difficult to handle but because of the blackening of the fibre and the dirt in the product.

Go next to the motive power for the grinder. In 50 percent of the cases I have witnessed, many of the water wheels on pulp grinders are inefficient, some of them transferring not over 50 percent of the power to the stone that the amount of water used should produce.

The dams back of the wheels many times leak so badly that a considerable amount of power is regularly lost.

To correct this waste in part at least is not difficult. If the water wheels are kept clean, rust removed inside and outside of runners with a sand blast and then painted with some good rust proof paint, a great saving will result. But, know yourself that the rust has been removed before painting at least once a year. Don't take someone's say for it.

Much waste comes from the condition of the grinders themselves. Many leak badly around the cylinders and there is not the pressure on the stone intended, besides the waste of power both in the water and on the stone by reason thereof.

There is waste in the kind of burrs or jigs used and the way they are used causing at time so much "mud" that it is lost in the white water, and at other times so many screenings that they go out the other way.

These screenings can be used. In fact, there are two distinctly different kind of fibre in a stick of spruce, the soft fibre between the annular rings and the hard long fibre of the rings themselves. By forcing the stone screenings are increased, but if the wood is properly cleaned and prepared, a screenings refiner can be used and the stock from the same run back into the pulp drains coming from the grinders, being re-screened until worn out.

If all the white water or return water from wet machines and deckers is not being reused in grinder pits and for showers except on felts there is waste, for many times as high as 4 pounds of pulp per 1,000 gallons goes to the sewer, which is about 10 percent of the pulp originally made.

There is a waste of power in pumps, piping, transmission, shafting, belts and pulleys and many of the layouts used today had better be in the junk pile, though the old saying goes, "Well, we've used them for 40 years and they ought to be good for 40 more."

If you are not getting a ton of good pulp from 50 to 60 horsepower on the stone, you are wasting, if making newsprint or coarse wrapping papers.

The kind of screens used and the way they are hooked up has much to do with whether there is waste or not. One type of centrifugal screen at 325 to 340 R.P.M. will screen more pulp at half the power that it will screen at 375 R.P.M., yet many plants are run with water wheels at different heads and at times the speed of such equipment is above, and at other times below the efficiency point.

There are so many places where there is waste in the pulp and paper industry that one has to draw a line between the different departments when writing a series of stories.

The wet machine is a place where there is waste of labor, power and felts, but the latter point will be taken up under the head of "Clothing" in a later story.

The decker may rightly be termed a part of the paper mill and as that is the heading of our next month's story, I will cease right here.

How Production Is Affected by Methods of Firing Boilers—Part III

Practical Suggestions for Handling Soft Coal Fires, Showing How and Why a Horizontally Baffled Boiler Must Be Fired Differently from a Vertically Baffled Unit

By JAMES T. BEARD, 2nd

This article concludes the discussion of practical methods of firing steam boilers in paper mill power plants. In succeeding issues other phases of power plant operation and management will be taken up and practical suggestions will be outlined for the attainment of maximum machine production and the maintenance of reliability and economy of operation by proper attention to the management of the power department.

IN A previous article the character of soft coal was discussed in an elementary way. An attempt was made to describe what takes place when this sort of fuel is fired into a boiler furnace and it was seen that the first result was the driving out of the fuel a large volume of so-called "volatile" gas. This gas is combustible and must be completely burned or it passes up the stack as a loss, in which case the boiler will operate at a low efficiency, the coal consumption will be increased, the steaming capacity of the boiler will be decreased, and cases will often arise where the reserve heat in the fuel bed will not be sufficiently quick-acting to meet sudden load demands upon the boiler, thereby resulting in a drop in steam pressure and consequent losses in production from time to time during the tour.

Practical methods for efficiently burning soft coal under boilers that were baffled in a vertical direction were discussed, with a view to eliminating these losses and increasing the reliability of operation and service of the power department.

With horizontally baffled boilers conditions are somewhat different. The volatile gases released from the coal when it is fired do not pass directly upward through the tube banks, as in the vertically baffled boiler. Instead they pass under the tubes, traveling from the grate at the front of the setting to the rear of the boiler before passing into the tube banks themselves. After they pass into the tube bank we are no longer interested in them from a combustion standpoint.

This action of the furnace gases is typical of what takes place in all horizontally baffled boilers, such as the Heine, Franklin, etc. Although the return tubular boiler is entirely different in design from the horizontally baffled water tube boiler, the furnace gases nevertheless, pass under the heating surface of the boiler from the front to the rear in much the same way in both types. From the standpoint of furnace combustion, therefore, we may assume that conditions in both cases are similar.

The path of the furnace gases in a return tubular boiler is clearly illustrated in Fig. 1. It will be noted that these volatile gases released from the front part of the grate must pass over the entire grate in their path to the combustion chamber at the rear. Obviously, if the entire surface of the grate is covered with fuel at one time these gases will pass into the tubes unburned or only partially burned. The unburned gases will pass through the boiler and up the stack as a total loss. The partially burned gases will be chilled by the contact with the cooler metal surfaces of the boiler and they will deposit soot on the boiler tubes, decreasing the efficiency of the boiler as well as its steaming capacity. Increased coal consumption will result and actual loss of paper tonnage may occur under certain conditions of sudden demand for live steam in the dryer rolls.

Let us see what happens if the boiler is fired alternately first one door and then the other, as in the case of the vertically baffled unit.

Suppose that the left hand door has just been fired with green coal, and that the right hand side of the grate is covered with a hot bed of live coals. These conditions would be ideal for a boiler of the B. & W. type, with its vertical baffles. In a horizontally baffled boiler, such as the Heine, Franklin, or in a return tubular boiler, such as the one illustrated, the unburned volatile gases from the left hand side of the fuel bed would pass to the rear of the setting, together with the completely burned gases resulting from the combustion of the fixed carbon on the right hand side of the grate. But their flow would be parallel. The hot burned gases from the right hand side of the grate would not mix with the cooler unburned gases from the left hand side. Combustion would be incomplete and conditions of low efficiency, steaming capacity, etc., would be almost as bad as if the grate had been entirely covered with a blanketing bed of green coal.

When the alternate system of firing is used in the vertically baffled boiler, these losses are largely prevented because the two kinds of gases have an opportunity to mix both in the furnace and in the tube banks, due to their deflection in various directions when they pass across the staggered tubes. In the

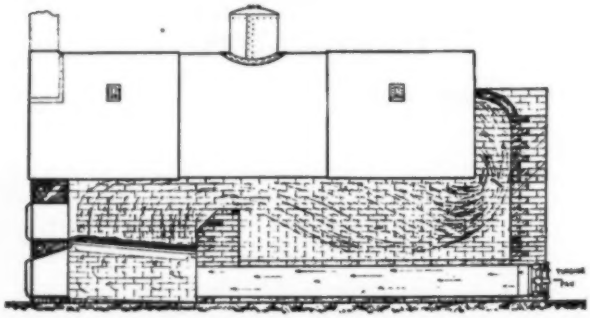


Fig. 1—Side view of a horizontal return tubular boiler, showing the path of the furnace gases. These gases pass from the grate, under the heating surface of the boiler, to the combustion chamber at the rear. This is also what happens in a horizontally baffled boiler, such as the Heine, Franklin, etc.

Heine and return tubular types of boilers, however, the gases are not deflected by the tubes, but pass parallel to them and thence to the stack. The mixing action is, therefore, not present.

The firing of a horizontally baffled boiler (or return tubular unit) would, therefore, be such that adequate mixing of the volatile gases with the hot burned gases will be accomplished. This is necessary in order to burn the volatile.

Experienced firemen have obtained the best results with soft coal under such boilers by allowing the green coal to coke upon the dead plate. To do this, they pile up the fresh coal on the front part of the grate, leaving the rear of the grate covered with the

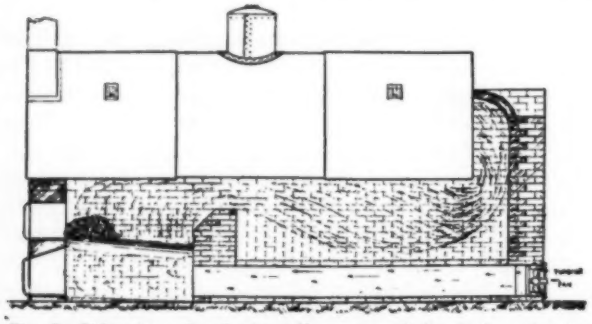


Fig. 2—Side view of a horizontal return tubular boiler, showing the proper method of firing soft coal. Fresh coal is fired on the dead plate at the front of the grate, where the volatile gases are driven off and the coal is allowed to coke. It is then broken up to insure the release of all the volatile. After the coking is complete the coal is pushed to the rear of the grate and the fuel bed is leveled off

hot live coals. The volatile gases from these live coals have already been driven out and they are now releasing an intense heat in the form of burned gases, resulting from the combustion of the fixed carbon.

As the gases are driven out of the fresh coal on the front part of the grate they must pass over the hot part of the fuel bed which is at the back of the grate on their way to the rear combustion chamber. Thus they mix with the hot burned gases and are subject to the intense heat of the live part of the fuel bed. The volatile gases become heated and burn in the combustion chamber back of the grate.

After the volatile gases have been released from the fresh coal on the dead plat at the front of the grate, nothing remains but coke (or carbon) and ash. It is necessary, however, to break up the coked mass of coal from time to time, in order to release all the volatile. This is done with a slice bar, which the fireman runs into the coal, in order to break it up. The breaking up always releases an intense heat caused by the sudden release of the volatile and its rapid burning as it passes over the hot bed at the rear of the grate. Firemen are accustomed to break up this coke when the boilers are suddenly called on for abnormal demands of steam on short notice. The quick release of heat in the furnace boosts the steam-

Firing Chart

Three Horizontal Return Tubular Boilers Burning Soft Coal

No. 1 Boiler (All Doors)	No. 2 Boiler (All Doors)	No. 3 Boiler (All Doors)
Fire		
	Fire	
		Fire
Slice		
	Slice	
		Slice
Level		
	Level	
		Level

ing capacity of the boiler and keeps the steam pressure from dropping.

When the coal on the dead plate has been completely coked, it is pushed back toward the rear of the grate and the whole fuel bed is leveled off, the carbon remaining on the grate burning in much the same way as hard coal would burn. This method of firing is illustrated in Fig. 2.

In ordinary practice it is customary to coal up say No. 1 boiler first, piling the fresh coal high on the dead plate, then passing to Nos. 2 and 3 and doing likewise. When the proper time has elapsed, depending upon the rate of forcing of the boilers and the coal burned, the fireman returns to No. 1, using the slice bar and breaking up the coked coal. He goes then to Nos. 2 and 3, doing the same. After the coking process is complete, he returns to No. 1 and levels the fire off, pushing the coked coal to the rear of the grate, and spreading it evenly over the entire grate area. He does the same with Nos. 2 and 3. A firing chart, showing the sequence of these operations in a 3-boiler plant, accompanies this article.

It is not difficult, in the average paper mill, to hold steam if common sense is used in the matter of using

the method of firing best adapted to the plant conditions. There are other factors to be considered, of course, and some of these will be taken up in succeeding articles. With proper attention to firing, however, giving due consideration to the coal that is burned and the kind of boilers in service, there will be more than an even chance of maintaining proper steam pressure, of keeping the paper machine running at maximum speed at all times, of saving considerable coal that is ordinarily wasted and of assuring continuous and reliable operation of the power equipment of the plant.

The Analysis of Coated Papers

By J. CROLARD and R. BONEY

(Translated from *La Papeterie* xlvi, 150-158, February 25, 1924, by A. Papineau-Couture.)

AMONGST the numerous and varied types of papers which a laboratory may be called upon to analyze, coated papers are in a class by themselves on account of their constitution, for they are made up of a base and a coating. The methods of analysis are different from those used for the other grades of paper, and they must be more accurate in order that the interpretation of the results may be reliable. In the course of the numerous analyses of coated paper which we have made and are still called upon to make we have adopted a standard procedure, which we think may be of interest to others who have occasion to do work of this nature; and we are describing it in the hope that it may be useful to others.

I—Preliminary Identification of the Chief Constituents of the Paper

We shall first of all ascertain the composition by weight of the chief constituents of the paper, namely: total weight; weight of the coating; weight of the base; composition of the base: composition of the coating.

In order to simplify the description we shall assume that the paper is coated on one side only, but the same remarks would hold if the paper was coated on both sides.

First of all, we must work on a known weight P of dry paper, and by taking a definite size of sample we get the weight per square meter, **P.M.** at the same time as the dry weight. A square sample is carefully cut out, choosing some simple and convenient dimensions, such as 10 cm. by 10 cm., so as to get a simple fraction of a square meter.

The paper is dried in the oven and weighed. This gives the total weight **P** of the paper to be analyzed, which is made up of the weight of the base, **S**, and the weight of the coating, **C**, (P=S+C); and as the area of the paper is known the weight per square meter, **P.M.**, is readily calculated.

In order that all results may be concordant, it is essential that the analysis be carried out on the dry paper (or calculated to the dry basis). We recommend the use of small glass-stoppered weighing bottles of suitable size for weighing the paper both before and after drying. The total weight **P** and the weight per square meter **P.M.** should be taken as the mean of several dimensions.

Separating the Coating

In order to determine **S** and **C** the coating must be separated from the base; and here we have two cases, according as to whether the coating is soluble or insoluble. A simple qualitative test will indicate which case we are dealing with. A small portion of the paper is wetted and rubbed with the finger: if the coating disintegrates and the base shows up through it, the coating is soluble; but if it does not disintegrate it is insoluble. The method to be followed differs in the two cases.

Soluble Coating. To determine the weight of base and of coating the sample is heated with water in a porcelain dish, taking care not to boil as this might result in a slight disintegration of the base. It is preferable to place the whole sample without tearing into smaller pieces to prevent loss of fibers. The coating rapidly dissolves out, and the base is taken out and carefully washed with water by means of a wash bottle, dried in the oven, and weighed, which gives **S**. **C** is found by subtracting **S** from **P**. The weights of both base and coating per square meter are calculated.

The composition of the base is next determined. It consists of fibers **F** and of filler **A** (S=F+A). The analysis presents no special difficulties and is carried out in the same way as that of any ordinary paper. A portion is defibered and examined microscopically to determine the nature and proportions of the various fibers. A definite weight of the base is incinerated, and the percentage of ash gives the amount of fillers, the nature of which is ascertained by the usual methods (China clay is most generally used as filler for coating stock). The sizing of the paper is a very important characteristic, and the nature and amount of sizing agents are determined by some rapid method. This completes the analysis of the base.

Determining the composition of the coating is the next step. It consists of: inorganic substances, or pigment, **B**; organic substances, or size, **O**.

We shall take up in greater detail further on the complete analysis of the coating, as it is the most

important part of the analysis of coated papers; but for the present we shall determine merely the relative amounts of pigment and of size. A known weight of the dry coated paper is incinerated, the ash giving the total amount of filler in the paper. As the amount of filler A in the base is known, the amount of pigment B in the coating is obtained by difference. Of course the sizing material used in the coating, whether it be gelatin, casein or wax, has been destroyed by the incineration. But the total weight C of the coating is known, so that the amount of size is easily obtained by difference: O=C—B.

Insoluble or Slightly Soluble Coating (Lithographic Papers). When the coating is insoluble or does not readily separate from the base, which is generally the case, it is necessary to make two determinations to get at the weight of the base. With a soluble coating we determined directly the weight S of the base, and the amount of fibers, F, and of fillers, A; but in this case we must do just the opposite, first we determined F and A separately, and their sum gives S.

Determination of the fibers is carried out by tearing the sample of paper into small pieces and boiling with a two to five per cent soda solution until the paper is completely disintegrated. The suspension is then filtered through a very fine wire cloth so as to retain only the fibers; and the filtrate is refiltered if it contains any fibers. The fillers are eliminated by thoroughly washing the fibers, which are then dried and weighed, thus giving F. In order to make certain that no filler has been retained by the fibers, a portion of them is incinerated. The ash should not exceed one per cent, which is about the normal ash content of pulps.

The amount of fillers in the base is determined by shaving off thin slices of the base with a razor blade and ashing them. Subtracting the amount of ash from 100 gives the percentage of fibers f in the base; and as we have already determined the percentage of fibers in the whole paper the percentage of base is very easily calculated:

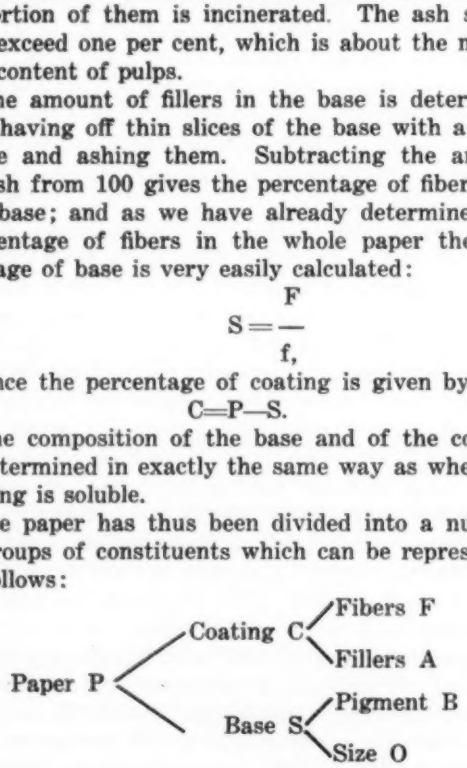
$$S = \frac{F}{f},$$

whence the percentage of coating is given by:

$$C = P - S.$$

The composition of the base and of the coating is determined in exactly the same way as when the coating is soluble.

The paper has thus been divided into a number of groups of constituents which can be represented as follows:



II—Complete Analysis of the Coating

The value of a coated paper depends very largely on the quality of the coating, as the consumer judges mainly by its general appearance, smoothness and adherence. Consequently, these papers are classified according to the quality of the materials used in the coating, and no analysis of a coated paper can be regarded as complete unless it gives as much information as possible on this point. We shall therefore go a little more fully into this portion of the analysis; but as this work must be done by a competent analyst we do not intend to describe the methods in great detail, merely contenting ourselves with a general description of the usual methods.

As we have already mentioned, the coating consists of pigments (mineral matter) and size (organic matter), and we shall deal with each of these two groups of substances in turn, briefly reviewing the principal substances used in each and indicating the methods of identification and of quantitative estimation.

Mineral Matter or Pigment

The most generally used pigments are: barium sulphate, or blanc fixe; china clay, or kaolin; satin white.

Barium sulphate or blanc fixe is a heavy, compact, white powder with a specific gravity or 4.3 to 4.6, which is obtained by the action of barium chloride or barium carbonate on sulphuric acid or alum. It is considered as the finest coating pigment.

Kaolin or china clay, which is used for medium qualities of coated papers, is a hydrated silicate of alumina corresponding to the formula $Al_2O_3.2SiO_2.H_2O$. It is a heavy white powder (specific gravity 2.2), which has a more or less yellowish tinge and is unctuous to the touch.

Only the very highest grade of china clay is used for coating: it must have a very low iron content (less than one per cent) and must be free from mica and from grit (less than 0.1 per cent).

Satin white, which is extensively used, is an artificial mineral consisting of a mixture of precipitated calcium sulphate and aluminum sulphate obtained by the action of slaked lime on aluminum sulphate. It is sold as a paste which usually contains 70 per cent of water, though at least one manufacturer sells a products containing only 55 per cent. It is a soluble pigment, the sulphate of alumina being completely soluble in water and the calcium sulphate slightly soluble.

A rapid qualitative test for barium sulphate in coatings consists in making lines on the coated paper with a silver article, a coin for example. In the presence of barium sulphate the lines permanently show up in black.

Qualitative and Quantitative Analysis of the Pigment

Though the above-mentioned reaction is quite

characteristic and will indicate with certainty the presence or absence of barium sulphate, it is by no means sufficient, and it is necessary to make a complete qualitative and quantitative analysis of the pigment. The same reactions are used in both cases, so that by operating on a known weight of coating both the nature and amount of the constituents can be determined simultaneously.

As before, we shall call **B** the amount of the pigment in the coating. Then **B** is equal to the sum of the various constituents, which can be: china clay, which we shall denote by **K**; barium sulphate, **M**; calcium sulphate, from the satin white, **R**; sulphate of alumina, from the satin white, **I**; then B=K+M+R+L.

Procedure. A given weight of the whole paper is ashed, and the ash is treated with water slightly acidified with hydrochloric acid and filtered.

The solution is examined for metals, and can contain alumina, from the satin white, and lime, also from the satin white, as calcium sulphate is slightly soluble in water. The alumina is precipitated by addition of ammonium chloride and ammonia, filtered, ignited and weighed; and the lime is determined in the filtrate by precipitating as calcium oxalate, and either igniting to calcium oxide and weighing, or else dissolving in sulphuric acid and titrating with standard potassium permanganate solution. By calculating the alumina found to sulphate of alumina we get **I**, while calculating the lime to calcium sulphate gives a part of **R**.

The **insoluble residue remaining** on the filter can contain kaolin (either from the base or from the coating), barium sulphate from the coating, and the major portion of the calcium sulphate of the satin white of the coating, which did not dissolve in the dilute hydrochloric acid. The filter is dried in an oven, the contents are transferred to a platinum crucible and mixed with six to ten times its weight of fusion mixture (anhydrous potassium and sodium carbonates in equimolecular proportions), and the platinum crucible and its contents are heated over a Meker burner or in a muffle until the whole mass is fused, and it is kept in a state of fusion for about twenty minutes. The crucible is then allowed to cool somewhat, carefully immersed in hot water which is kept boiling until the fused mass has disintegrated and fallen out of the crucible.

The fusion has rendered insoluble the alumina of the china clay, the baryta of the barium sulphate, and the lime of the satin white, which are filtered off; and the silica of the china clay and the sulphuric acid of the calcium and barium sulphates are in solution in the filtrate in the form of sodium silicate and sodium sulphate.

The insoluble residue is dissolved in hydrochloric acid. Addition of ammonium chloride and ammonium hydroxide precipitates the alumina, which is filtered off, washed, ignited and weighed. The barium and calcium in the filtrate from the alumina re-precipitated as carbonates by addition of ammonium carbonate. They are redissolved in hydrochloric acid, the solution is exactly neutralized with ammonia and then strongly acidified with acetic acid. The barium is precipitated as barium chromate by addition of potassium chromate, and the precipitate is filtered, washed, ignited and weighed. The filtrate is neutralized with ammonia, heated to boiling, and the lime is precipitated as calcium oxalate and determined either gravimetrically (ignition to calcium oxide) or volumetrically (by titration with permanganate).

The water soluble portion of the carbonate fusion is acidified with hydrochloric acid and evaporated to dryness on a sand bath. The residue is taken up with a little dilute hydrochloric acid and evaporated to dryness a second time to render the silica completely insoluble. After the second evaporation the residue is taken up with boiling water, slightly acidified with hydrochloric acid, and the silica filtered off, washed, ignited and weighed. The filtrate contains the sulphate radical from the barium sulphate and calcium sulphate, which is precipitated by heating the solution to boiling and adding an excess of barium chloride. The precipitated barium sulphate is filtered off, washed, ignited and weighed, taking the usual precautions.

Interpretation of the Results. The amount of china clay is calculated from the alumina and silica found, taking an average value for the moisture content, say about 12 per cent. The barium sulphate content **M** is calculated from the baryta, weighed as barium chromate. The calcium sulphate is calculated from the amount of lime found. The sulphate determination acts as a check on the barium and lime determinations, the total amount of sulphate being equal to the sum of the sulphate radical in the barium sulphate and in the calcium sulphate.

The amount of filler in the base (which we will suppose to consist of china clay) is deducted from the total amount of china clay in the paper, giving the china clay content of the coating, **K**. The sum of the calcium sulphate in the soluble and in the insoluble portions of the coating gives the total amount of calcium sulphate in the satin white, **R**; so that we have now determined all the constituents of the pigment of the coating, that is B=K+M+R+I. Of course, the sum of the various constituents, as determined above, must check up with the total amount of coating pigment found according to the method described earlier in this article.

It should be observed that in most cases the analysis can be very greatly simplified. Though it may, at times, be advisable to determine both the barium and the sulphate of the barium sulphate, as a rule this is unnecessary. Barium sulphate is a perfectly definite compound, and determination of

the barium is quite sufficient. Similarly, for china clay it is quite sufficient to determine either silica or alumina, and to calculate the amount of kaolin on the basis of a 48 per cent silica content or a 37 per cent alumina content.

Organic Matter or Size

The sizing materials most extensively used are gelatin and casein; and as accessory sizing materials wax and starch are used.

Qualitative Analysis of the Size. With a white or slightly colored paper, Millon's reagent is used for testing for gelatin, as follows: one or two drops of the reagent are placed on the paper and dried at a moderate temperature (to avoid blackening the paper). A red color indicates the presence of gelatin. A more general test consists in boiling small pieces of the paper with a small amount of water (even with hardened gelatin enough will be dissolved to give the test), and decanting into two test tubes. A few drops of 5 per cent tannin solution is added to one tube, and in the presence of gelatin there is formed a white precipitate which coagulates on heating. A few drops of saturated aqueous picric acid solution is added to the second tube, which is then vigorously shaken; a yellow precipitate indicates the presence of gelatin.

Casein is detected by means of Adamkiewicz' reaction. A few pieces of paper are treated with a solution of borax, and when the size has been dissolved the paper is removed and the solution is evaporated to dryness. A portion of the residue is heated in a test tube with 2 cc. of Adamkiewicz' reagent (one volume of concentrated sulphuric acid and two volumes of glacial acetic acid), and in the presence of casein a beautiful violet red color should develop. Unfortunately the reaction is not very reliable and at times it gives only a dirty yellow coloration.

Wax is very easily detected by dropping a little sulphuric ether onto the surface of the paper. On evaporation the ether will leave a round mark. This test is practically the same as used for detecting rosin in paper.

Quantitative Analysis of the Size. Gelatin is determined by Kjeldahl's method. As gelatin contains a definite amount of nitrogen, the amount of the former is readily calculated from the amount of the latter. One gram of the paper is placed in a Kjeldahl flask with 10 cc. of concentrated sulphuric acid and heated strongly for a few minutes. Two to five grams of pure potassium sulphate is then added, the liquid is heated to boiling, and boiled gently till completely decolorized, which may require several hours. After cooling the solution is transferred to a large distilling flask, made alkaline with excess of caustic soda solution, and distilled into an erlenmeyer flask containing 20 cc. of decinormal sulphuric acid. The distillation requires watching, as the alkaline solution is liable to bump, which might cause some of the liquid to splash over or the acid to suck back. The distillation takes about 20 to 30 minutes. The excess of acid is then titrated with decinormal sodium hydroxide. One cc. of decinormal acid is equivalent to 0.00972 g. of gelatin.

The nitrogen content of casein is very close to that of gelatin, and is determined in the same manner.

The wax content can be obtained by difference.

New Formula for Cleaning Wires

UNDER date of April 30th, the Wire Cloth Manufacturers' Association has sent the following letter to a large list of paper mills:

"Dear Sir: As you know, the problem of cleaning paper machine wires is frequently a source of annoyance and loss to the paper mill. Cleaning fluids now in use often injure the wire if they are strong enough to remove the substances that clog it up.

"The Wire Cloth Manufacturers' Association, the members of which produce a considerable part of the wires made in America, have realized this difficulty, and have employed one of the best known laboratories in the country to work out a formula which would best accomplish the desired result. The expense has been considerable, but the manufacturers realize that they will profit by the longer service which will be secured from wires properly cleaned.

"With the full consent and approval of Mr. William G. MacNaughton, Secretary and Treasurer of the Technical Association of the Pulp and Paper Industry, we offer you the following suggestion, which is the result of exhaustive research and test by the Miner Laboratories of Chicago.

"We quote from the conclusion of the Miner report:

" 'It is our opinion that if the wires could be periodically subjected to an acid treatment for a very short period of time and thoroughly washed while the machine was in operation, the "brown scale" and consequently the clogging due to it could be prevented. But we recommend that this be done with sulphuric acid to which at least one-half percent of formalin has been added.'

"Formalin is a 37 to 40 percent solution of formaldehyde in water.

"Both Mr. MacNaughton and the Wire Cloth Manufacturers' Association would be glad to hear from mills applying this treatment.

"Sincerely yours,

"Wire Cloth Manufacturers' Association."

The Wire Cloth Manufacturers' Association offers the result of this research work as a contribution to the more effective care and use of wires, and will be glad to cooperate further with the paper mills interested. The address of the association is 304 Tacoma Building, Chicago.

Cost and Factory Accounting

Part III

By H. M. GRASSELT
American Writing Paper Company

THE preceding chapter on power and steam distribution would be incomplete, if no mention were made of the Power Plant Log, since power plant cost accounting depends on this record for fundamental data on coal consumption, steam engine hours and similar statistical details.

A power plant log, like the power and steam distribution sheet, represents valuable statistical material as to past performances and results. Its itemized entries and monthly or periodical totals afford a convenient supplementary means for the allocation of accurate steam and power charges to the respective departments and processes at the end of each cost period.

To reiterate: power costs are made up of the following items: Labor (wages of engineers, firemen and helpers); Fuel; Oils, grease and sundry supplies; Taxes, insurance and depreciation of power plant; Cost of repairs and maintenance; and Cost of water (for power generation and feeding).

The combined totals of these items constitute the total power plant expenses, which at the end of a cost period are apportioned to the various departments and processes in ratio of their respective power and steam consumption to the actual total consumption, as illustrated in the preceding chapter.

In concluding the chapter on power plant costs and their proper distribution, a few boiler house instruments will be enumerated, that facilitate the accurate allocation of power and steam charges and also afford an effective check on waste which otherwise for a considerable length of time might go on unabated. These instruments are: carbon-dioxide recorder; flue-gas thermometer; steam flow meters; feedwater meters; and recording draft gauges. The proper use of these instruments and the records derived therefrom, frequent tests and a few adequate cost records will better enable the steam engineer to stop leaks and introduce economies in the right direction for the benefit of the entire enterprise.

Depreciation

In determining depreciation charges, the cost and probable useful life of the individual piece of equipment or machinery is to be taken as a basis for the annual percentage. It is advisable to base depreciation charges on the cost and not on replacement. Mills that are about to install a cost system and have no accurate records of original purchase costs of their equipment, should have their property appraised and then base the yearly depreciation charges on the thus established net book value of each unit.

As to the rate at which depreciation should be charged, there exist in the paper industry certain definite standards for the various machines and pieces of equipment, based on the construction, use and wear and tear of the respective unit. These rates were published some time ago by the trade associations and it appears, that their application is rather general and uniform throughout the industry.

J. P. Jordan and Gould L. Harris in their book "Cost Accounting Principles and Practice" (The

POWER PLANT LOG

Date	Coal Used	Steam Engine Hours									Steam Boiler Hrs.					Bleach Boiler Hrs.					Water Power Conditions and General Remarks
		Main	Fin.	No. 1 Mach.	No. 2 Mach.	No. 3 Mach.	Light	Shop			No. 1	No. 2	No. 3	No. 4	No. 5	No. 1	No. 2	No. 3	No. 4	No. 5	
	TOTALS																				

Ronald Press Co.) write "Many pieces of equipment will have perhaps a depreciation of 25 per cent, because of their special nature, either as to delicacy of construction or because they become quickly obsolete. Other pieces of equipment may be subject to a depreciation of only 5 per cent. . . . The depreciation of buildings should be on the basis of value of building used by each department and depreciation on machine tools and equipment on the basis of actual circumstances as stated above. . . . In all cases it is best to use what is called the 'straight line' method for recording depreciation—namely, a regular amount per month rather than a diminishing charge."

Depreciation is a large item in overhead expenses and cannot be ignored in cost accounting. It does exist and the decreasing value of equipment and building consequently plays an important part in the obtainment of true factory costs. Depreciation is an element of cost and it is, therefore, not good accounting practice to charge it annually to profit and loss. Mills that treat depreciation charges in such way often show in prosperous years excessive charges, whereas in lean years only trifling charges or none at all were made. Wear and tear go on under either industrial condition and in each instance an appropriate allowance for depreciation not made good by maintenance charges has to be made.

Insurance

Insurance is to be included in the cost of the product. Plant fire insurance has to be kept separate from boiler house insurance, since the latter has been taken care of in calculating power and steam costs.

Insurance on buildings is to be charged to the individual departments and processes in ratio to floor space. Insurance on equipment is apportioned according to cost of the separate unit; insurance on raw materials is included in their handling expenses and chargeable to the product, but insurance on finished stock is to be treated as merchandising expenses and as such, of course, not included in the factory cost. Accident insurance is based on the total of the payroll and charged to general factory expenses.

Taxes

Only taxes on real estate and plant are to be charged to manufacturing cost, as taxes on finished stock are considered a merchandising or general expense. Income tax depends entirely on the profit made in the course of a fiscal year and, therefore, chargeable to profit and loss.

Interest

The question whether or not interest on the invested capital should be treated as an element of cost is still rather unsettled and has perhaps aroused more discussion than any other subject on factory costs. The National Association of Cost Accountants sent out a questionnaire last fall and 567 members expressed their views on the subject as follows:

For inclusion of interest.....112 or 19.75%

Against inclusion of interest..455 or 80.25%

Thus, an overwhelming majority of men in practical life and vitally interested in costs and the proper application of the elements thereof, voiced their disapproval of inclusion of interest in factory costs. Further, decisions in numerous legal cases have disallowed the use of interest on the invested capital as an element of cost and ruled "that nothing that is not actually an expense of production can be used in diminution of profits."

Aside from these objections, there exist a few more difficulties that have to be overcome before interest can be standardized for the inclusion in factory cost. It would require to determine the basis of the correct rate to be used, conditions under which it might be proper to include interest in cost and what proportion of investment in buildings and equipment should be used as basis for the calculation of interest. Interest merely represents the profit on the investment; to include it in the cost would, therefore, mean an attempt at trying to collect the profit in two ways and to obtain a portion of it before it is earned. Further, the inclusion of interest inflates costs and inventories and represents a disposal of part of the profits before they are earned through the regular channel, that is, the sale of the product.

The adherents of inclusion of interest in the factory costs have quite a few arguments in backing their conviction. They claim, that inclusion of interest is necessary for the standardization of cost and that it is furthermore justified in cases where materials have to be stored for a long period while certain seasoning processes are being completed or where the manufacturing process requires a long time for completion and so forth.

Both groups have good arguments in their favor and books have been written on the subject; there still exists the enumerated marked difference of opinion and there are no indications that point toward an adoption of an uniform treatment of interest in cost accounting.

Packing and Shipping

Packing and shipping is, as a rule, not included in manufacturing cost, as many mills believe it a better practice to charge it against gross profit or close it out to profit and loss. A standard rate, based on past records can be established and applied in calculation. A rate of thirty cents per hundred pounds for cased papers should cover fixed charges apportioned to the shipping department, labor, supplies and miscellaneous expense items.

Control Accounts

A system of adequate control accounts in the general ledger, that absorb all of the elements of cost from period to period, is absolutely necessary in order to provide a means of proving the accuracy of cost figures. To attempt to operate a cost system without a comprehensive method of checking the periodical results would lead to disappointments and total failure of the cost system itself. Without control accounts, leaks would go on unnoticed and a thorough analysis of the manifold processes would be rendered problematical. A cost system must be tied up with the general books in order to be effective, accurate and dependable.

It is not difficult by any means to establish control accounts; they are arranged in the general ledger under four principal classifications, viz., Assets, Liabilities, Income and Expenses. Assets may be divided into current assets, such as cash on hand and in banks, accounts receivable, bonds, inventory accounts (raw materials, process materials, stores account, miscellaneous supplies, work in process and finished stock), fixed assets, which include buildings, equipment, machinery and land and deferred assets, like unexpired insurance and taxes. Patents, good-will, etc., constitute intangible assets.

Liabilities are classified in a similar way into respective accounts for notes payable, accounts payable, reserves for depreciation on buildings, equipment and machinery, accrued payroll and so forth.

Income accounts show products shipped, miscellaneous cash sales, scrap sales, discount and interest earned.

Expenses. Its elements are manufacturing ex-

MATERIALS

Balance	000	00	Work in process	000	00
Purchases	000	00	Balance	000	00
Freight and express	000	00			
	000	00		000	00
Balance	000	00		000	00

WORK IN PROCESS

Balance	000	00	Finished Goods	000	00
Material	000	00	Balance	000	00
Labor	000	00			
Factory Overhead	000	00			
	000	00		000	00
Balance	000	00			

POWER

Labor	000	00	Building Expenses	000	00
Fuel	000	00	Departments and processes	000	00
Oils, grease, sundry supplies	000	00			
Taxes, insurance	000	00			
Depreciation	000	00			
Repairs and Maintenance	000	00			
	000	00		000	00

DEPRECIATION RESERVE

Balance	000	00	Balance	000	00
			Building Expense	000	00
			Power	000	00
			Repairs	000	00
			Departments and processes	000	00
			Shipping	000	00
			General Expense	000	00
	000	00		000	00
			Balance	000	00

SHIPPING

Labor	000	00	Profit and Loss	000	00
Building Expenses	000	00			
Insurance	000	00			
Taxes	000	00			
Depreciation	000	00			
Repairs	000	00			
Miscellaneous Supplies	000	00			
Miscellaneous Expenses	000	00			
	000	00		000	00

LABOR

Total Payroll	000	00	Balance	000	00
Balance	000	00	Work in process	000	00
			Building expenses	000	00
			Power	000	00
			Repairs	000	00
			Departments and processes	000	00
			Shipping	000	00
	000	00		000	00
			Balance	000	00

penses, direct material, productive labor, discount allowed, taxes, insurance, general expenses and others.

Many of these items may be supported by subsidiary accounts, carried either in the general ledger, separated by indexes, or in a separate book, termed the Factory Ledger. So may, for instance, the raw materials and process supplies accounts be subdivided into individual accounts for 1 rags, these again in various sub-classifications if desired; 2 domestic and foreign bleached sulphite; 3 domestic and foreign unbleached sulphite; 4 soda pulp; 5 alum; 6 sizing; 7 glue; 8 colors and so forth.

Likewise, separate subsidiary accounts should be established for machine clothes, wires, boxboards and nails, wrappers and repair shop supplies.

Entries in these subsidiary accounts are made from cost summaries and tabulated requisitions on stores at the end of each cost period, the totals of these accounts then transferred to the respective principal control accounts. Thus, only the principal control accounts comprise the monthly trial balance and not an endless row of subsidiary accounts.

Trial Balance, March 31, 1924

Materials	000.00	
Labor		000.00
Insurance, Taxes	000.00	
Depreciation Reserve		000.00
Overhead—Departmentalized	000.00	
Work in process	000.00	
Finished Goods	000.00	
Sales		000.00
Sales returns and allowances	000.00	
Shipping	000.00	
Selling Expenses	000.00	
General Expenses	000.00	
Accounts receivable	000.00	
Accounts payable		000.00
Cash	000.00	
Buildings, Machinery and Equipm...	000.00	
Capital Stock		000.00
Surplus		000.00
	000.00	000.00

The profit and loss statement, like the statement of factory operations for the individual cost periods, comprise the respective balances of the control accounts and the balance sheet ultimately exhibits the results of the periodical operations as follows:

Balance Sheet, March 31, 1924

Current Assets			
Cash		000.00	
Accounts Receivable	000.00		
Less res. for bad debts	000.00	000.00	
Raw materials		000.00	
Work in process		000.00	
Finished Goods		000.00	0000.00
Fixed Assets			
Land	000.00		
Buildings	000.00		
Machinery & Equipment	000.00		
Less depreciation res. on items 2 and 3	000.00		0000.00
Deferred Assets			000.00
Total Assets			0000.00
Current Liabilities	000.00		
Capital Liabilities	000.00		
Surplus	000.00		0000.00
Net Profit for Month			000.00
			0000.00

The interspersed specimen of control accounts and balances merely outline the principles of the procedure and lay no claim to being a complete illustration of the entire system. In the control accounts, the principle of double entry bookkeeping is used; so is, for instance, the materials account charged with all purchases of materials from the accounts payable and issues are charged to the work in process account, crediting the materials account.

Future issues will offer a general description of cost analysis, collecting of data from the entire process of manufacture, summaries and other details. Since each mill has its special problems that must be treated individually, no attempt has been, nor will be, made to describe a definite cost system. Only the principles of the numerous phases of factory cost accounting are and will be considered for the purpose of showing how "the other fellow" does the work and to offer a few suggestions that perhaps may be applied advantageously in other plants.

Trying to Get Something for Nothing

We realize that war loosens the elemental passions and that they are difficult to get back into control. Little demons were set loose in society and none is more assiduous and elusive than the demon which takes the form of trying to get something for nothing. The fortunes lost and made overnight back of the fighting line appealed to the worst in men and utterly broke down some of our staunchest moral standards. Not alone in high places has this imp capered and pranced, but in the lowlier places it is doing its deadly work; nothing was so irresistible as the chance to make a quick fortune.

Let us scotch the demon; let us chase him until his legs grow weary; let us put him in chains. For, without morals, a nation cannot endure. Its leaders must place honor and justice first and the rank and file of the people must elevate honesty, and rather have their tongues clipped than to steal and defraud. Every right-thinking citizen, every red-blooded man in business must recognize that without honor and honesty commerce cannot develop because credit is the foundation of commerce, and credit cannot survive without confidence based upon human morality. —J. H. Tregoe.

Pointers for the Engineer

W. F. SCHAPHORST, M. E.

Does Pulverized Coal Pay?

ACCORDING to comparative tests made in a large power plant, pulverized coal is more efficient than stoker fired coal by about 4%.

It should be remembered, however, that the cost of pulverizing the coal and the cost of more expensive handling must be considered and must be paid for out of this 4% increase in efficiency, a feat that the writer considers doubtful in the face of the following statement that recently appeared in a prominent publication:—

> "The cost of grinding and distributing equipment—under average conditions, amounts to 15 to 20% of the fuel cost. Sometimes it is less, but in many cases it is considerably more."

Probably the above quotation referred to a cheap grade of coal in which case, efficiency is of less importance than making the coal burn and produce heat. One of the great advantages of powdered coal is that it enables us to utilize mine sweepings and coal dust which are practically unburnable on grates.

In general, it is safe to say that the first cost of pulverized coal apparatus is about the same as the first cost of stoking apparatus. Sometimes stoker firing is preferable and sometimes powdered coal. Conditions are seldom exactly alike in any two plants, consequently, all plants should be individually studied before deciding upon the mode of firing. At any rate it is not likely that it will ever pay to change from stoker firing to powdered coal in old plants because of the fact that even in new plants the advantage of powdered fuel is often doubtful.

Where a uniform grade of coal is unobtainable, pulverization reduces all grades and kinds to a uniform burnable size and therein lies one of its greatest advantages.

What Did Archimedes Really Say?

THE writer has seen many different kinds of statements attributed to Archimedes with reference to his famous lever. Nearly all of the quotations, however, are different and the differences have been the cause of many an argument. Finally, to settle the last argument I looked it up and I find that a literal translation is simply this, "Give me a place to stand and I will move the earth."

One of the most common translations into which the translator injected some additional ideas and waxed poetic is this: "Give me where to place my fulcrum and a lever long enough and I will move the earth."

The reason for these differences in quotations appears to be "translator's license" because of the fact that what Archimedes originally said was in Greek. Consequently, translators evidently feel privileged to tell us what Archimedes meant rather than what he said.

One remarkable thing about this quotation is that it was made about 300 years before Christ at a time when, according to history as it is taught, all people believed the earth to be immovable. Was Archimedes aware of the fact that the earth is round and that it is movable? His statement sounds very much as though he did not consider it flat—that he believed it to be movable just like the sun, moon, planets, and stars.

Belt Elasticity

A PROMINENT belt merchant recently wrote me that his belt is highly elastic yet it creeps very little. He claims that it creeps less than any other belt on the market. I replied:

"If — Belting has a very high coefficient of friction it probably does not slip at all. It may be very elastic and yet have an exceedingly high strength in which case it would creep less than other belts. If — Belting is stronger than oak tanned belting, and I believe it is, it probably has a higher coefficient of elasticity because it appears that the coefficient of elasticity increases with strength. Thus steel has a higher coefficient than wrought iron and wrought iron than copper, copper higher than wood, wood higher than leather, etc."

Lignite Needs No Briquetting

NATIVES of North and South Dakota cannot understand why the government insists on considering lignite coal as "worthless." Why spend money treating it or briquetting it? Why all this study and scientific research? The following is copied verbatim from a small weekly country town paper published in South Dakota:

"A good many thousands of dollars of good government money has been spent in laboratories trying to find some patent process for utilizing lignite. That is what has been going on in the great government indoor sport of fuel experimenting.

"Out here in South Dakota, and perhaps more especially in North Dakota, a good many thousands of dollars have been saved in finding out that all you need to do is to give lignite a fair chance in an ordinary furnace or heating stove. Washington says it's worthless and wastes time pulverizing it or briquetting it, or 'ovening' it; the Dakotas know

it's valuable and heave it onto fires just as it comes from the mines.

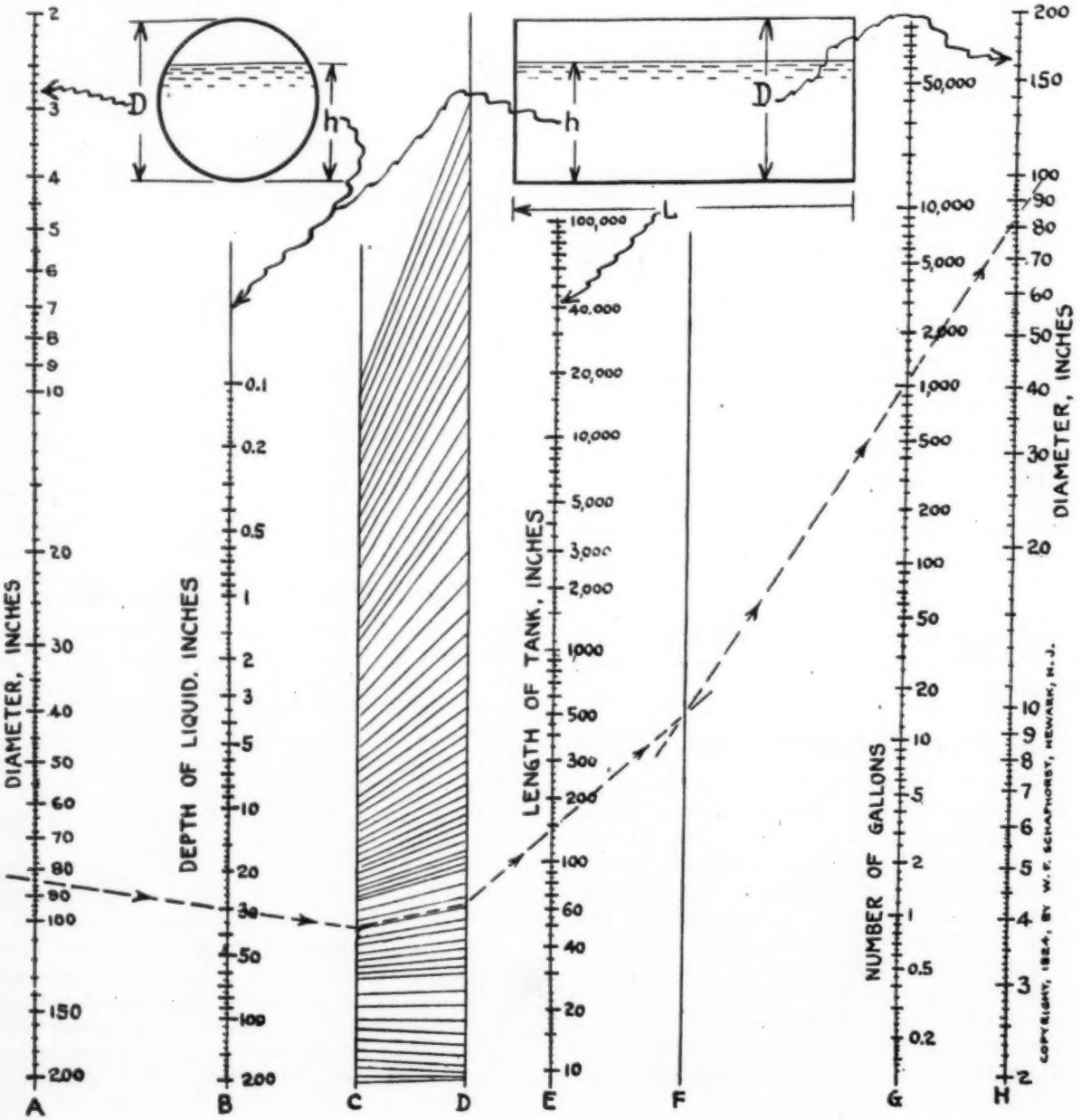
"It isn't any wonder that sometimes we marvel at the processes of government, or even at the stupidity of science. What Uncle Sam should do is to send a few of his eminent fuel specialists out here to South Dakota, supply them with shovels and make them understand how easy it is to burn lignite just as any coal is burned, and keep very comfortable during the process."

A Horizontal Tank Chart

THE writer has had numerous requests from paper mills for a chart that will give the contents of horizontal tanks and at least one has been developed that gives the gallons of liquid in any such tank without the use of tables, formulas, figures, or computations of any kind.

Simply start at the left and zigzag a ruler or thread across the chart three times as demonstrated by the dotted line and the number of gallons is immediately found in Column G. For example: How many gallons in a tank 84" in diameter, the depth of liquid being 30", and the length of the tank being 142"?

Run a straight line through the 84, Column A, and the 30 in Column B and locate the intersection with Column C. By means of the eye follow the radiating "guide lines" to Column D, locating a second point of intersection. From this latter intersection run through the 142, Column E, and locate



the point of intersection in Column F. Then from this point run over to the 84, Column H, and the intersection in Column G will be found to be close to 1050 gallons, which is the answer.

One of the great advantages of this chart is that it takes care of any depth of liquid from 1/10 of an inch to the full capacity of the tank. All guess work is eliminated. To make the chart absolutely clear the writer has included sketches showing the diameter of the tank D, the depth of liquid h, and the length of tank L with wavy arrows leading from them to the proper columns. By following them no mistake can be made.

The range of the chart is amply wide. It will take care of any diameter from 2 inches to 200 inches and of any length of tank from 10″ to 100,000″.

This chart will give an answer much more quickly than tables or formulae. It is surprisingly accurate. It is more complete than tables because it takes care of every dimension between 2 inches to 200 inches, whereas tables generally skip many diameters and lengths giving only 24″, 28″, 32″, 34″, etc.

To avoid confusion all dimensions are given in inches.

Since Column E takes care of lengths of tanks up to 100,000″ it is plain that not only will this chart compute tanks but it will include long pipes whenever it is desired to compute either the full capacity of such pipes or their partial capacity. 100,000″ is equal to 8333 1/3 feet.

Inversely the chart may be used very conveniently for determining the length of tank necessary to hold a given number of gallons where the diameter of tank and depth of liquid are known or fixed quantities as is often the case. The method of applying the chart to problems of this character is so obvious that further directions are unnecessary.

Oil Drips

We still find many plants where oil is permitted to drip on the floor or anywhere else despite the many sermons that have been preached and the volumes that have been written against it. I have been in plants where I feared walking across the floor because of its slipperiness. Or, I would have the feeling that oil would soak up through my shoe soles. There is many an oil-soaked floor in the United States that will go up in flames in a few minutes should a fire ever start.

Better than to permit the oil to splash around on the floor is to use drip pans, but drip pans, also, are unsightly. It is a good plan to get rid of them wherever possible. Some engineers have found it possible to replace the drip pan with a circular oil guard formed around the eccentric or crank, or bearing or whatever it is. By so doing the space-consuming drip pan becomes a useless feature and things look more shipshape.

One of the big advantages of oil guards of this kind is that they **collect the oil** and permit it to be used over and over. There is no reason in the world why oil should be used only once and then allow it to soak into the floor. It is much more economical to use it repeatedly and use "an abundance" of lubricant. In the old days engines and machinery were oiled just a little at a time and the trick was to give the bearings as little as possible, yet keep from having a hot box. Today we aim to give bearings more than enough, save it, and use it again.

Why Do Boilers Explode?

IN RECENT issues of THE PAPER INDUSTRY there has been some discussion on the above subject. The writer took the stand that fire tube boiler explosions are more disastrous than water tube boiler explosions because the former hold more water per horse power. F. W. D. took issue with the writer.

With a view to getting unprejudiced information on the subject, the writer inquired of a prominent manufacturer who makes both types of boilers—fire tube and water tube—without explaining to the manufacturer why the question was asked. He replied as follows:—

"Beg to advise that a Return Tubular boiler will contain more water per horse-power than will a Water Tube boiler of equal size. For instance, on a 72″x18′ boiler with 70-4″ tubes and rated at 150 horse-power, beg to advise that the weight of the contained water would be 22,800 lbs. On a 150 horse-power Water Tube boiler having 74-4″ tubes with one 36″ drum the weight of the contained water would be 13,000 lbs."

In other words this manufacturer's fire tube boiler holds nearly twice as much water as does the water tube type. The writer now feels more strongly than ever that his stand was justified.

Choosing Your Friends

In your daily work do not be afraid to compete with the man who is a little higher than you. It is competition with other minds better than our own that sharpens our intellects just as a knife will become sharpened when rubbed against a stone.

The associations a man keeps usually point out his degree of intelligence. Nothing is easier than finding plenty of people to "loaf" with, but their companionship will net you nothing unless they are a few rounds higher on the ladder of achievement than you.

Select as your friends and associates men who are doing things—be with them when you can and get some of their ideas. Learn how they do things and they will be an inspiration and an incentive for you to do better work. Always choose companions from whom you can learn something.—The House of SaBen.

Editorial Comment

By WILLIAM SIBLEY

Where We Landed When We Headed "Back to Normalcy"

TENNYSON allowed his "Lotus Eaters" to cry:

"We have had enough of action, and of motion we,
"What pleasure can we have to war with evil?
"There is no joy but calm."

Had Tennyson been alive during the last months of the Wilson Administration he could not have penned lines more descriptive of the then existing mental state of the American public. Four years ago the American people, generally speaking, were weary and sick of war. They were anxious to rest their over-strung nerves. For the most part they were bored and impatient with the President who continued to talk of "ideals," "duty" and "principles."

Recognizing this, those crafty, clever students of human nature, the practical politicians, offered two men as candidates for the Presidency. One a little known state governor; the other an equally obscure senator. Afraid of a continuation of the boresome "ideals," enough of the American people to provide a 17 million plurality, hailed with delight the small town publisher who knew little of the practical and still less of the theoretical phase of government, but who said, principally: "Less government in business—more business in government," and who gave the promise of a return "back to normalcy."

Having been elevated to the greatest and most powerful throne of earth—over the heads of three men who had previously shown great administrative and executive ability, i.e., Wood, McAddo and Hoover—Mr. Harding carried forward some great and far reaching movements. The Washington Conference and the World Court were probably his greatest achievements. His stand against the bonus was courageous. His budget system to control Federal appropriations required leadership. To support the enactment of a statute restricting immigration demanded shockless nerves.

But his outstanding campaign promise was to go "back to normalcy." And that meant, so far as the public was concerned, a lower range of feeling, less diligent effort—to rest on the oars. And it was this unvigorous, undirected, too-soft characteristic on the part of both President and people that permitted unscrupulous politicians and grasping "personal friends" to get into positions where they could do things which have recently transformed Congress from a legislative body to a glorified grand jury.

And we believe that we have learned our lesson. We know now that you, I, and every other voter—the great American people—are to blame for the oil scandal, the alleged duplication of government bonds, etc. *We* lowered our ideals, our range of feeling. *We* thought there was "no joy but calm." *We* had had enough of "war with evil." *We* wanted to rest on our oars—to drift with the stream—to ease our taut nerves. *We* wanted to go *"back* to normalcy."

We did. And here we are—at our destination—all of us to blame. No doubt we are Lotus Eaters now as four years ago, the difference being that our Washington scandals and investigations have supplanted war activities. Mr. Harding was not corrupt. Nor did he condone corruption in others. But he was easy-going, amiable. So were we. Far more than the President, we are to blame, for we gave him the power to be easy-going.

There remains three things to do. First: punish the guilty so severely that they be made unforgettable examples for posterity. Second: see to it that the more radical element does not take advantage of the present situation to further shake our trust and faith in our government, then use that lack of faith to their own gain. Third: resolve never to go *back* to anywhere. Let us go onward—forward. And the only way we can feel certain we are going in the right direction is to take an active, personal interest in not only elections but year 'round government business.

McNary-Haugen Bill

AS THIS is written, every indication points to a bitter fight in Congress over the McNary-Haugen bill. This is the measure that provides for the creation of a $200,000,000 government corporation, established to buy enough of each agricultural product to raise domestic prices to pre-war relationships with other commodities; sell this surplus abroad at world prices, then distribute the loss incurred equitably among the farmers.

The proponents of this measure claim that its passage will give the farmers the artificial protection now afforded manufacturers by the tariff and to labor by the immigration restrictions.

Opponents say that the bill will effect every citizen in America by falsely boosting the price of wheat and bread. They also say that it is decidedly socialistic; that it would stimulate over-production on the part of the farmer. None of these claims are flatly denied by the proponents.

The tactics of the supporters are to first import

—— on Timely Subjects

into Washington a corps of Western lobbyists that pressure may be brought to bear on wavering Congressmen and Senators. They are also endeavoring to trade western votes on the Ford-Muscle Shoals bill for southern votes on the McNary-Haugen bill.

And opponents are trying to amend the bill so that it will look like the original draft but won't be. Also, they are endeavoring to load on some clause that will make it unconstitutional but which will remain undiscovered until after elections.

Feeling over this bill is so high that its failure to pass will doubtless bring about the voluntary resignation of Secretary of Agriculture Wallace.

Our own reaction to the bill is: The fact that it is offered as a temporary measure only (its duration being for five years) should warrant its careful examination by everyone. As we view the trend, it is not improbable that this country, in 1929, will be importing, rather than exporting, food-stuffs. In which event the agricultural problem will assume an entirely different aspect. The farmers will then be in a position comparable to the manufacturer and be demanding, not a vehicle for the disposition of an exportable surplus, but a protective tariff.

Concerning Tooth Brush Drills

IN A GREAT number of grade schools the country over, teachers and principals are having the children go through a daily tooth brush drill. The movement is good. It is doing much to prevent mouth and teeth diseases. If carried forward diligently for ten or a dozen years we should see better, sounder teeth in the coming generation.

In a great many ways various people are advocating peace—universal police force—limitation of armaments, etc. That also is good. It is doing much to educate people out of the idea of war, with all its attendant horrors and grief.

But there are people who go too far in this peace advocacy. These few advocate complete disarmament—the rendering helpless of able bodied nations. They want to do away with the Citizens' Military Training Camps, the R. O. T. C., the Army, the Navy, the Boy Scouts, the Girl Scouts, the Camp Fire Girls, and all kindred organizations.

And that is wrong. Just as wrong as anyone would be who said: "Now that you are having tooth brush drill and are educating the children on mouth and tooth sanitation—we'll quickly burn all dental colleges and abolish all dentists. We will throw all dental equipment in the river."

The man who approached the various school boards with that suggestion would be no more foolish than the pacifist who wants to disarm the nation.

Bankers to Have Their Inning

THERE will probably be a great deal of public talk within the next two months anent the McFadden bill for the amending of the national bank and federal reserve act—offered mainly to prescribe definite limits to branch banking. Though the house committee will probably report the bill in this session, actual work on it will, without doubt, hang over until December.

And this is good. What this country is in most need is prompt, constructive legislation for tax reduction. And however we stand in opinion regarding hows or wherefores, we should wire our representatives and senators in Washington to *get busy*.

During 1923 the maintenance of Congress cost the American tax payer $48,000,000. At the usual six-month period this is a cost of about $32,000 a day. Assuming that our legislators work ten hours a day, that means $3,200 an hour—$50.00 a working minute. It is not likely that Congress will cost less during 1924.

Over four months have now slipped by, with little constructive legislation to its credit. If we don't see to it that Congress gets busy *soon*, we will not have gotten much for our fifty dollars.

Witnessing the Erection of a 32 Story Building in 16 Minutes

WHEN the erection of the S. W. Straus Building on Michigan Boulevard, Chicago, was started, Rothacker Film Company erected a camera house in Grant Park—just opposite and in full view of the construction.

In this little house was installed a motion picture camera (tripod cemented to the floor and a camera bolted to the tripod so that the focus would not vary a fraction of an inch). And here a camera man comes, every day, and cranks a few feet of film.

Shortly after the completion of the building (June 1, 1924) audiences can behold a 32 story building being constructed—literally spring out of the ground —in 16 minutes.

To frown, 64 muscles must come into activity. To smile requires the action of but 13 muscles. Why work so hard?

Asphalt-Saturated Rag Felt Specification

THIS specification applies to asphalt-saturated rag felt intended for use with Asphalt for Mineral Surfaced Roofing (F. S. B. Spec. No. 84), Asphalt for Unsurfaced Built-up Roofing (F. S. B. Spec. No. 88), and Asphalt for Waterproofing and Damp proofing (F. S. B. Spec. No. 85) in the construction of built-up roofing and membrane waterproofing, respectively.

It shall be composed of rag-roofing felt impregnated with an asphaltic saturant, and when tested by the methods contained in this specification must meet the following requirements:

(a) Appearance.—It shall be free from visible external defects and uniform throughout. When unrolled at temperatures between 50 and 90° F. it shall not stick to such an extent as to cause tearing.

(b) Width.—32 or 36 inches ± one-fourth inch.

(c) Cross Weight of Roll.—50 to 80 pounds.

(d) Weight of Wrapping, Packing, Etc.—Maximum, one-half pound.

(e) Weight per 100 Square Feet Exclusive of Packing, Etc.—14 pounds ± 1 pound.

(f) Pliability at 77° F.—No cracking on bending flat on itself.

(g) Average Breaking Strength.—With fiber grain, 30 pounds; across fiber grain, 15 pounds.

(h) Loss on Heating at 221° F.—Maximum, 4 per cent.

(i) Weight of Moisture-Free Desaturated Felt per 100 Square Feet.—Minimum, 5.2 pounds.

(j) Weight of Saturant per 100 Square Feet.—Minimum, 1.4 times the weight of moisture-free felt per 100 square feet.

(k) Weight of Comminuted Surfacing per 100 Square Feet.—Maximum, 1 pound.

(l) Ash of Desaturated Felt.—Maximum, 8 per cent.

(m) Packing and Labeling.—The felt shall be properly wrapped and labeled with the manufacturer's name, brand, grade, weight, area of roll, and type of saturant.

If required, deliveries will, in general, be sampled and tested by the following methods, but the purchaser reserves the right to use any additional available information to ascertain whether the material meets the specification.

Sampling and Determination of Weight and Width

The weight per 100 square feet of the material and its variation in weight can be most accurately determined by the inspector at the time he takes a sample for transmittal to the testing laboratory.

(a) From each shipment select at random a number of rolls of felt equivalent to the cube root of the total included in the lot. If the cube root as calculated proves to be a fractional number, express it as the next higher digit.

(b) Remove wrappers, cores, and other packing material from each roll selected and weigh the roll and the packing material, etc., separately to the nearest one-fourth pound. Then unwind each roll and measure the length and the width of each end of the roll to the nearest one-fourth inch, and reroll. Observe the appearance of the material while unrolling and rerolling.

The finished material shall be free from visible external defects, such as holes, ragged or untrue edges, breaks, rents, cracks, or indentations. The rolls shall be capable of being unrolled easily at temperatures between 50 and 90° F. without sticking in a manner that will injure the felt. The surface of the felt shall not be coated or covered with talc or other substances which would tend to interfere with the adhesion between the felt and the plying cement. The use of silica or wood flour will be permitted. The surface shall be uniformly smooth and shall be free from areas or patches of unabsorbed saturant and superficial dry spots.

Compute the weight per 100 square feet of each roll examined, and from these weights compute the average weight of the shipment. In no case shall this be less than 13 pounds per 100 square feet, and any roll examined whose weight is less than 13 pounds per 100 square feet shall be cause for the rejection of the whole shipment. If the average weight is above 15 pounds per 100 square feet, the material shall be paid for on the basis of 15 pounds per 100 square feet.

(c) From the rolls examined for sampling, select one the weight of which is near the average weight of the whole lot. Unroll, and at approximately 25 feet from the end cut two samples the full width of the roll and approximately 40 inches long, label, carefully wrap, and transmit one to the testing laboratory. Retain the other sample for check analysis in case of dispute.

Laboratory Examination

(a) Appearance.—Examine both sides of the sheet of felt and note for uniformity of color. The felt shall be thoroughly and uniformly impregnated and shall show no unsaturated spots at any point upon cutting 2-inch strips at random across the entire sheet and splitting them open for their full length.

(b) Weight.—Trim the sample so that it is 36 inches long and the full width of the roll. Measure accurately, and weigh to the nearest gram (15 grains). From the measurements and weight so obtained compute the weight per 100 square feet.

(c) Pliability.—Cut five strips 1 inch wide and 6 inches long in the direction of the fiber grain and immerse in water at 25° C. (77° F.) for 10 to 15 minutes. Remove the strips from the water and immediately bend each strip flat over a one-sixteenth-inch mandrel through an arc of 180° at a uniform rate in approximately two seconds' time.

(d) Breaking Strength.—Cut 10 strips of the felt 1 inch by 6 inches with the fiber grain and 10 strips of the same size across the fiber grain. Test both sets of strips at 21° C. (70° F.) in a Scott or similar testing machine of the inclination-balance type having a capacity of 100 to 150 pounds. The test strips shall be gripped 1½ inches on each end, leaving 3 inches between the clamps, and the lower jaw shall travel at the rate of 12 inches per minute. If any strip breaks nearer than one-half inch to either clamp, the reading shall be disregarded and an additional strip tested in its place. The average of the 10 readings from strips cut in one direction shall be taken as the breaking strength of the sample in that direction.

(e) Loss on Heating.—Cut two strips of the asphalt-saturated felt 6 inches wide and 12 inches long, weigh each strip, and suspend it for five hours in an oven maintained at 105° C. (221° F.) ± 3° C. (5° F.). Remove from the oven, cool in a desiccator, and weigh. Compute the loss in weight and average the results on the two samples.

(f) Weight of Desaturated Felt.—Cut a 2-inch strip the full width of the sample, measure accurately, weigh, and extract with carbon tetrachloride or benzol in a suitable extraction apparatus until the solvent runs through colorless. Remove the desaturated felt from the extractor and allow to remain in air until the solvent has evaporated. Brush off any adhering particles of surfacing and retain. Then place the desaturated felt in a tared weighing bottle, dry at 105 to 110° C. (221 to 230° F.) for one-half hour, cool and weigh. Compute the weight per 100 square feet of the desaturated felt.

(g) Comminuted Surfacing.—Filter the extract [obtained above in section 3 (f)] through a tared Gooch crucible prepared with a mat of asbestos fiber. Wash all sediment from the extraction apparatus into the Gooch crucible with carbon tetrachloride or benzol and transfer also all surfacing brushed from the felt [in section 3 (f)] to the Gooch crucible. Wash the insoluble matter on the filter with carbon tetrachloride or benzol until the washings run through colorless. Suction may be used to aid in filtering. Place the crucible with contents in an oven at 105 to 110° C. (221 to 230° F.) for one-half hour. Cool in a desiccator, weigh, and from the weights of the sample taken [in section 3 (f)] and the weight of surfacing obtained, compute the weight of comminuted surfacing per 100 square feet.

(h) Saturation of Felt.—The weight of asphalt in the saturated felt is the difference in weight between the original sample taken for extraction [in section 3 (f)] and the sum of the weights of the desaturated felt [obtained in 3 (f)] plus the weights of the comminuted surfacing [obtained in 3 (g)]. The percentage saturation is obtained from the following formula:

$$\frac{\text{Weight of asphalt in saturated felt}}{\text{Weight of moisture-free desaturated felt}} \times 100 = \text{percentage saturation.}$$

(i) Ash.—Cut the strip of desaturated felt obtained in 3 (f) into squares about 1 cm on each side, and thoroughly mix. Select at random pieces amounting to about 10 g, and after drying at 105 to 110° C. (221 to 230° F.) for one-half hour and cooling, weigh accurately and incinerate in a weighed crucible in a muffle or over an open flame until all the carbon is consumed. Cool, weigh, and compute the percentage of ash in the moisture-free desaturated felt.

*Circular of the Bureau of Standards, No. 161. Copies of this and the publication entitled "U. S. Government Specification for Coal-Tar Saturated Bag Felt for Roofing and Waterproofing," Bulletin No. 81, may be had from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Decayed Wood for Sulphite Pulp

By JOHN D. RUE[1], R. N. MILLER[2] and C. J. HUMPHREY[3*]

THE most vital problem confronting the paper industry of this continent is the provision of an adequate and continuous supply of pulpwood. One of the most important factors in this problem is the loss caused by decay, which is on a par with fire in its destruction of wood. The recent devastation by the spruce budworm in Eastern Canada and Northeastern United States and the Lake States has added to the gravity of the situation because it has been followed by serious decay. The attention of the industry throughout the country is, therefore, very rightly focused on the relation of decay to a supply of wood. Too much emphasis cannot be laid upon the necessity of utilizing even the rotted wood, provided this can be done economically. Equal emphasis should be laid upon the need for every precaution in handling and storing pulpwood to protect it from unnecessary further decay after it leaves the stump.

Decay is caused by wood-destroying fungi which feed upon the wood, rendering a portion of it volatile, another portion water soluble, and other portions less resistant to the action of chemicals. Some of these organisms cause destruction chiefly of the cellulose; some, in addition to their action upon the cellulose, also attack the lignin to a greater or less degree; some initiate their attack in the sapwood and others in the heartwood. All of these effects have a vital bearing upon the use of the wood for pulp manufacture. Faull,[4] Schierbeck,[5] and Hawkings[6] have called attention to various diseases and decays in spruce and balsam as found in the forest. The types of decay which these authors have discussed are characteristic and readily distinguishable.

The logging superintendent who is supplying his sulphite mill with wood is confronted with the very practical problem of determining how to select wood which will produce sufficient pulp of a commercial grade to warrant sending it to the mill. He needs to know whether the mill can use wood which is decayed. More than that, he needs to know how badly it may be decayed before it has lost economic value. He should have some method, therefore, of measuring or determining the degree of decay. He should know how the various prevalent types of decay vary in their destruction of the pulping value of the wood. He should know, further, how rapidly the wood will continue to decay under the conditions of transportation and storage to which the wood is subjected before it actually enters the manufacturing processes.

This report deals with some of the results obtained at the U. S. Forest Products Laboratory in a study of a very limited phase of this problem. A preliminary survey has been made of the utility for sulphite pulp of spruce and balsam infected with a few of the most important types of wood-destroying fungi. The study has so far been limited to the

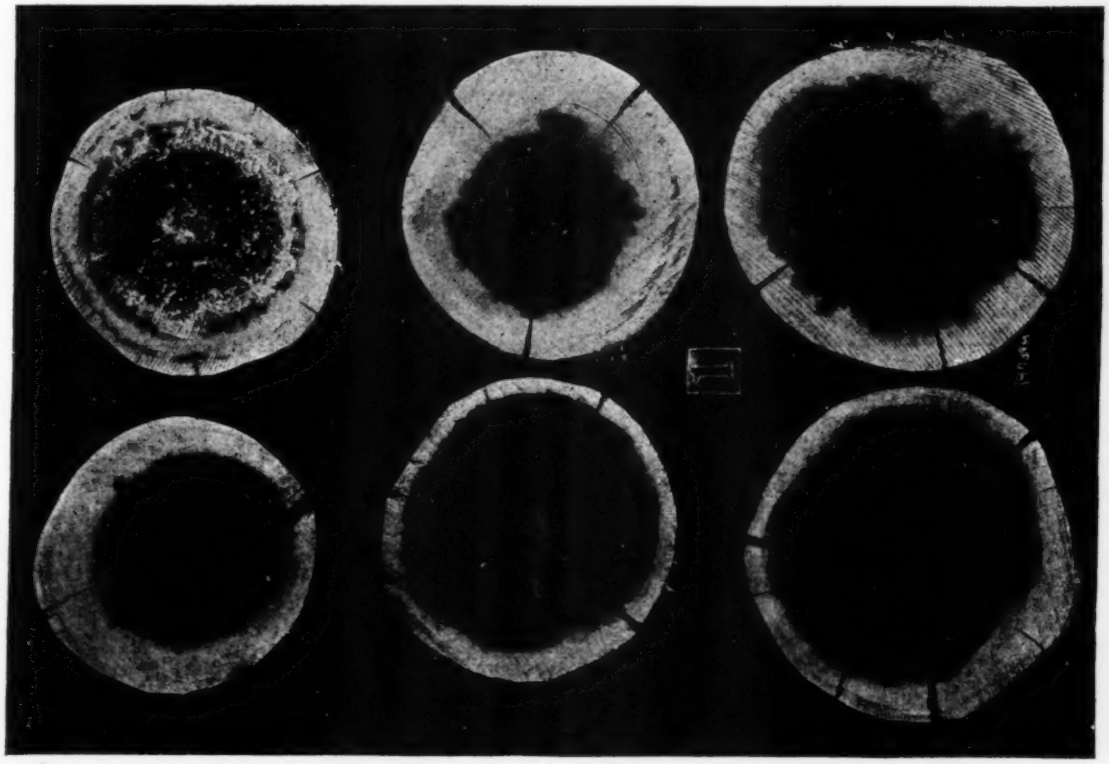


Fig. 1. Mixed Feather Rots

* Presented at the joint session of the Technical Section and Woodlands Section, Canadian Pulp & Paper Association, Montreal, Jan. 24, 1924.

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[3] Pathologist, Office of Forest Pathology, Bureau of Plant Industry, Madison, Wisconsin.

[4] Faull, J. H., Forest Pathology. In Report of the Minister of Lands and Forests of Ontario, 1919, pp. 119-125; 1920, pp. 224-235; 1921, pp. 259-266.

[5] Schierbeck, Otto, Treatise on the Spruce Budworm, Bark Beetle and Borer, pp. 1-38; Published by Frank J. D. Barnjum, New Birks Building, Montreal, 1922.

Schierbeck, Otto, Use of Decayed Wood in Paper Making, Pulp and Paper Magazine of Canada, 21, 262-264, Mar. 8, 1923.

[6] Hawkings, C.S.V., Decayed Wood in Paper Making; Pulp and Paper Magazine of Canada, 21, 287-289, Mar. 15, 1923.

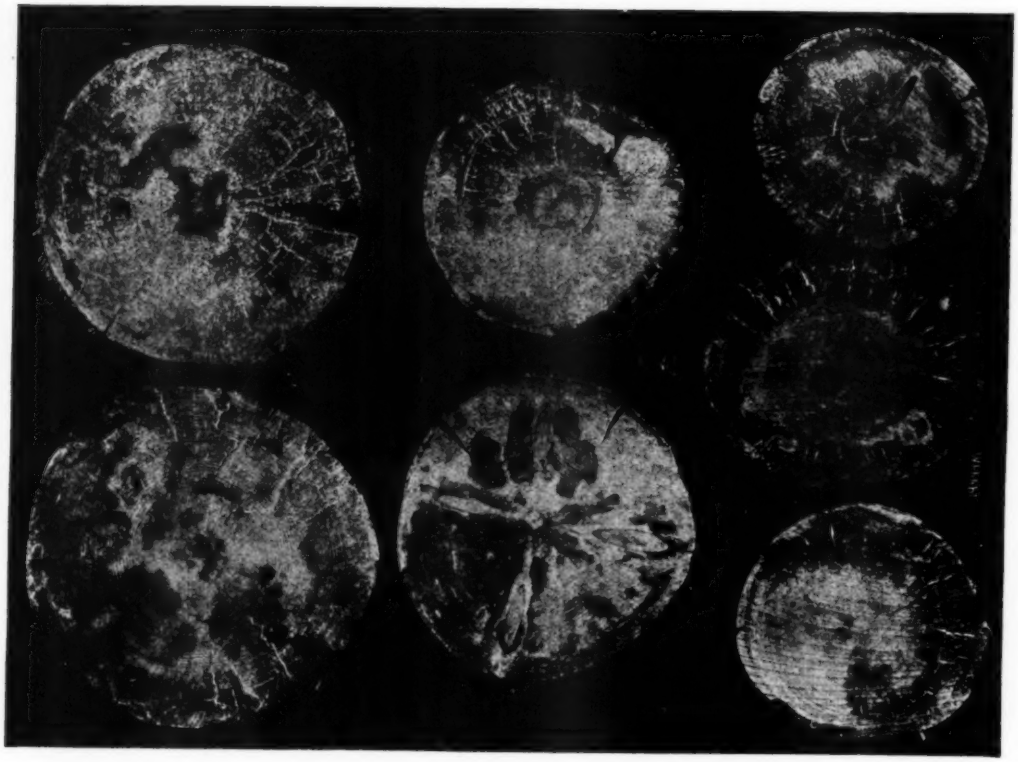

Fig. 2
Fomes pinicola

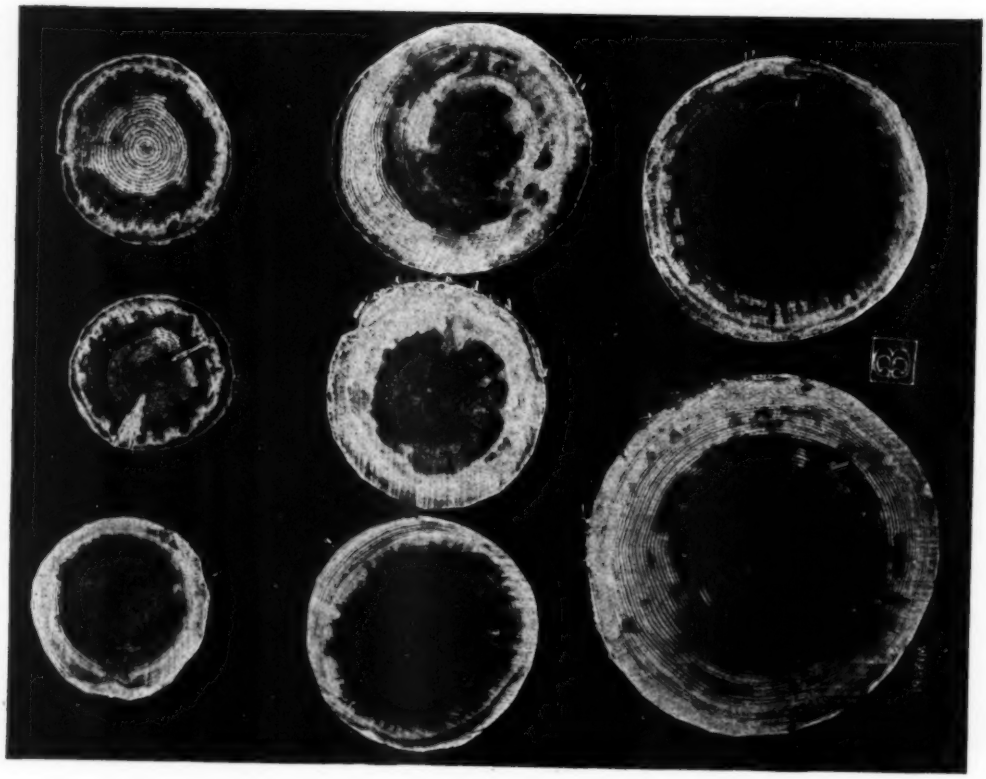

Fig. 3
"Hemlock Heart Rot"
Grade 1

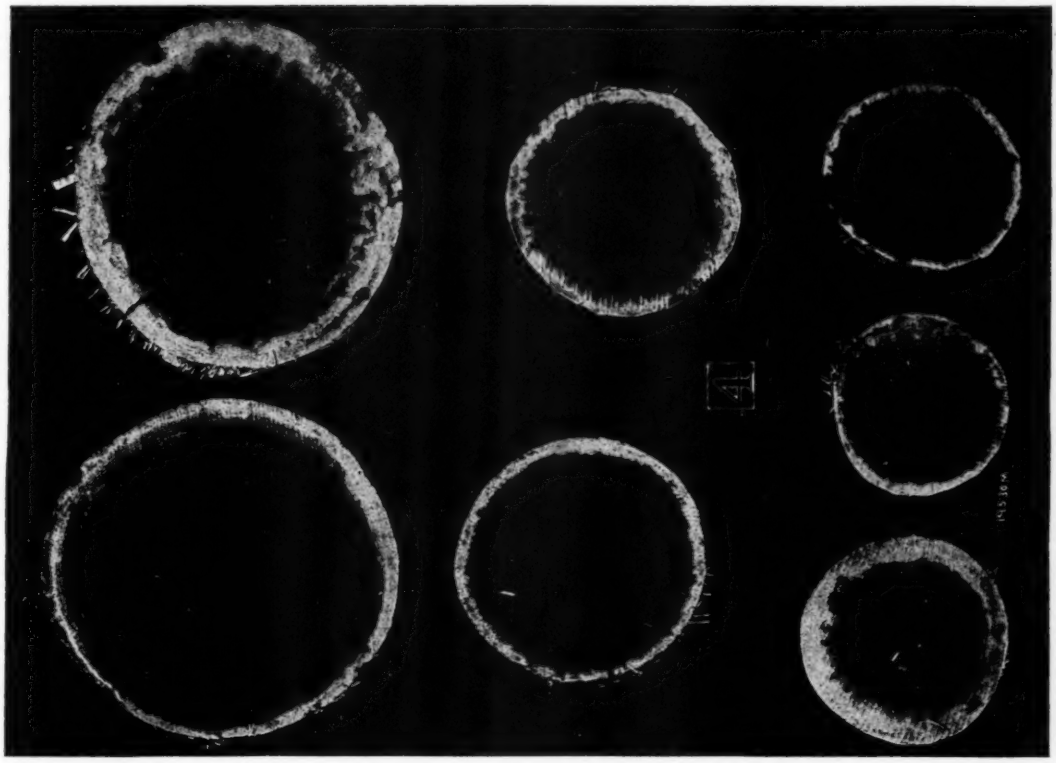

Fig. 4
"Hemlock Heart Rot"
Grade 2

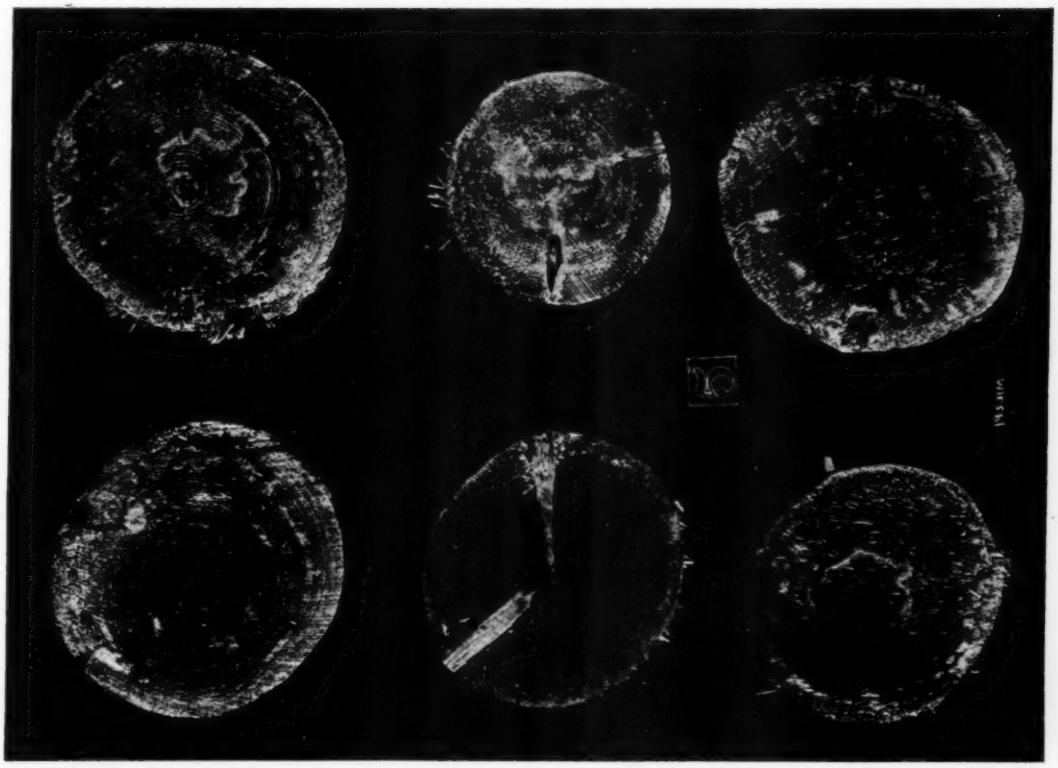

Fig. 5
"Hemlock Heart Rot"
Grade 3

determination of the utility of the wood as found. The effect of transportation and storage on utility is a matter of vital importance which must receive attention as opportunity permits.

Description of the Wood Samples and of the Types of Decay Represented

Through the courtesy of Price Brothers, Ltd., and the Laurentide Company, Ltd., the wood studied was supplied gratuitously from the limits of Price Brothers near Lake Kenogami, Quebec. The wood was selected by a forest pathologist representing the Laurentide Company, Ltd., and Price Brothers, Ltd., working in conjunction with a pathologist from the U. S. Forest Products Laboratory.

The wood selected, shipment No. 975, represented (1) sound balsam, (2) balsam infected with the fungi, *Fomes pinicola*, *Polystictus abietinus*, a mixture of several species of fungi referred to as mixed feather rots, and a particular type of fungus resulting in a decay which has heretofore gone under the name of "hemlock heart rot," and (3) spruce infected with *Trametes pini*. A sample of sound spruce from Minnesota, shipment No. 963, was also included in the investigation for purposes of comparison.

The name "hemlock heart rot" is inappropriate, and a more suitable one should be selected. So far as known, it is not an important decay of hemlock. Studies of the organisms producing this type of decay and the feather rots are under way by Dr. Faull of the University of Toronto.

Areas of balsam and spruce killed by the budworm, or other agencies, are particularly subject to infection from several of the fungi represented, particularly *Fomes pinicola* and *Polystictus abietinus*. The fungus of "hemlock heart rot," besides producing a heart rot in living trees, also causes an important sap rot in dead balsam timber. When developing in a living tree it may occur at any point on the trunk, although but rarely in the butt. *Trametes pini*, while primarily a heart rot in living spruce, can also rot the sapwood of dead timber. The feather rots are principally confined to the heartwood and usually start at the center of the trunk, enlarging the area of infection as they develop. They usually enter the trees through the roots and cause butt rots.

The rots due to *Fomes pinicola* and *Polystictus abietinus* are somewhat darker than the normal wood and in advanced stages make the wood soft and easily crumbled. The "hemlock heart rot" is accompanied by a decided reddening or browning of the affected wood and a progressive softening of its structure until in the last stages the wood becomes very soft, and stringy rather than crumbly. The feather rots in an advanced stage cause a disintegration of the center of the log into flattened strips and slivers of softened wood, which gradually fall away, leaving a hollow in the log. Around the slivered center a darkened area is found; in the earlier stages of infection this darkened area may be the only easily discernible characteristic.

Trametes pini is easily recognized by a brown and white speckled appearance of the cut end of the log, caused by the presence of pockets which are lined with the bleached wood fiber. With this fungus the softening of the wood structure in the living tree is not so apparent in advanced stages as in the case of the other species studied.

All the fungi represented are prevalent in the balsam and spruce forests of Eastern Canada. The percentage of infection of any given fungus may vary widely for different localities, but they can all be found to some extent in any of the regions investigated. On any large operation in living timber the feather rots and "hemlock heart rot" are bound to be well represented and of great economic importance. If the forests contain a considerable proportion of unthrifty spruce, *Trametes pini* may prevail, while in forests with much timber dead for two to three years or more such fungi as *Fomes pinicola* and *Polystictus abietinus* become common and very destructive.

There are several other important rots in the region investigated, the physical characteristics of which do not differ essentially from the types above indicated. They may therefore be expected to have similar effects upon the pulping value of wood infected with them.

So far as is known, "hemlock heart rot" is not prevalent in the United States. The other species will probably all be found extensively represented in northern forests in the United States as well as in Canada, and will probably be equally destructive in both countries.

All the material taken from the woods for experiment was graded by the pathologists before shipment. Based on the apparent degree of firmness the different samples would rank as follows, beginning with the least softened: sound wood, "hemlock heart rot" grade 1, "hemlock heart rot" grade 2, *Trametes pini* rot in spruce, mixed feather rots, sap rot due to *Polystictus abietinus* "hemlock heart rot" grade 3, and friable sap and heart rot of *Fomes pinicola*.

With the exception of "hemlock heart rot" grade 1, the experimental logs would, under present logging practices in this region be considered unsuitable for pulp and probably would be culled by the scaler and left in the woods.

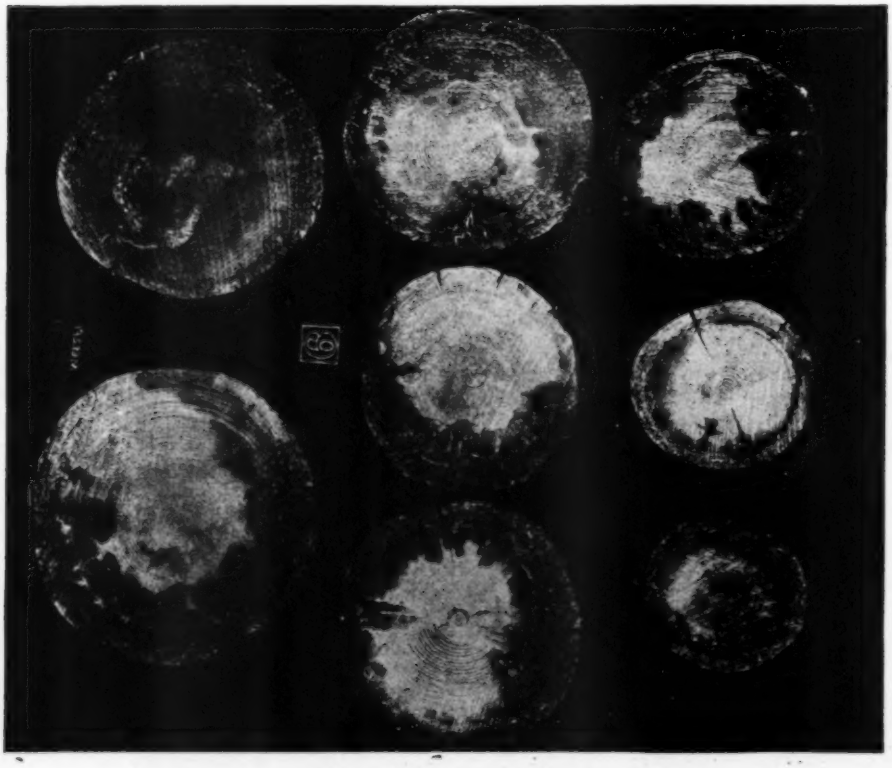

Fig. 6. Polystictus abietinus

Preparation of the Wood for Pulping

The wood was received at the Laboratory in the form of 4-foot bolts. Representative portions of each type or grade of rot were selected for cooking and were barked by hand with drawn knives. In the case of the sap-rotted specimens, care was taken to remove only the bark. A cross-section disc was removed from the middle of each barked bolt, and the discs were photographed. (See Figs. 1 to 7, inclusive.)

The measurement of the amount of rot was based upon the outline of discoloration visible to the unaided eye on the freshly exposed cross sections. Tracings of the discolored and the total areas of the freshly cut center sections were made on tissue paper. The volume of the sound and the infected wood in each bolt was calcu-

lated from these areas, measured with a planimeter, and from the length of the bolt. This calculation is based upon the assumption that the discolored portion was uniformly disposed through the bolt, an assumption justified by an examination of several of the bolts after splitting. The error in these volume measurements is perhaps ± 5 per cent.

The various portions of wood were weighed and chipped, the thoroughly mixed chips were sampled for moisture, and the weight of dry wood per cubic foot was calculated on the basis of the volume obtained as indicated above. A portion of chips was taken from each sample for chemical analysis.

The chips were not screened before cooking but the knots were picked out by hand. The yields obtained in this way, therefore, show the losses that take place in the cooking operation when the wood is cooked in its entirety.

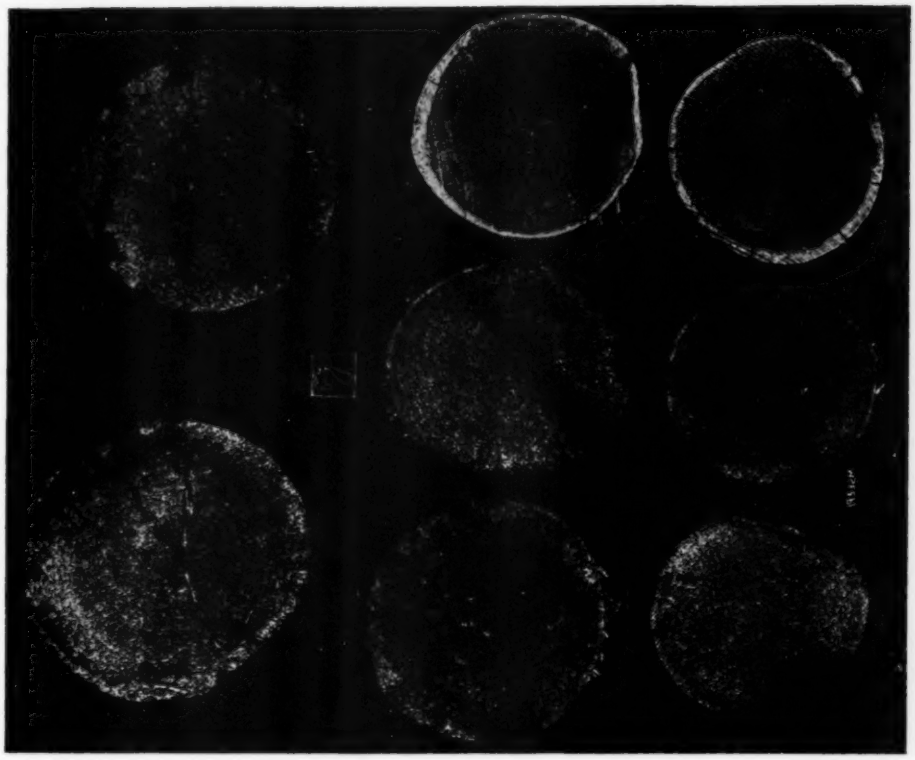

Fig. 7. Trametes pini

Conditions of Pulping

The same volume of chips was used in each cook. The variation in the weight of the chips together with the need for keeping the digester filled with liquor, prevented the maintenance of a fixed ratio of acid to wood. In all cases 50 gallons of acid were used and the digester was filled with chips.

Table 1.—PHYSICAL PROPERTIES OF WOODS AND YIELDS OF PULP

Samples for each species listed in order of decreasing firmness of the wood. Yields figures are averages for two cooks.

Sample No.	Fungus	Volume of discolored wood, percent	Weight per cubic foot of wood, pounds	Yield of oven dry screened pulp, percent	Yield of oven dry screenings, percent	Total pulp yield per 100 cubic foot of wood, pounds
	BALSAM					
975-0	None	None	20.8	49.6	0.8	1048
975-3	"Hemlock heart rot" grade 1.	55	21.0	51.0	0.9	1085
975-4	"Hemlock heart rot" grade 2.	74	21.1	48.9	1.2	1057
975-1	Mixed feather rots	31	21.0	50.6	0.9	1082
975-6	Polystictus abietinus	66	17.8	49.1	1.5	900
975-5	"Hemlock heart rot" grade 3.	100	16.6	45.6	1.3	785
975-2	Fomes pinicola.	69	18.0	40.0	0.6	733
	SPRUCE					
963	None	None	26.2	45.7	1.7	1240
975-7	Trametes pini..	96	22.3	51.1	0.7	1153

The acid used was made up from high grade calcium lime and liquid sulphur dioxide to a strength of 5.00 per cent total — 3.80 per cent free and 1.20 per cent combined sulphur dioxide.

The temperature and pressure conditions in all cooks are shown in Fig. 8. These conditions were selected because of the belief, based upon experience with the small digester used, that they would produce pulp of news grade with the highest possible yield. All cooks were made to represent a cook by the direct steam or Ritter-Kellner process.

Discussion of Pulping Data

Yields—The yields obtained from the various samples of infested wood, together with those obtained by way of comparison from sound spruce and balsam, are shown in Table 1.

The sample of wood infested with *Polystictus abietinus* gave a normal yield on the weight basis, but, owing to a marked decrease in the density of the wood, the yield on a volume basis is somewhat below normal. These samples infected with "hemlock heart rot" and *Fomes pinicola* gave yields which on both the weight and the volume bases are below normal. The yield from the wood infected with *Trametes pini* was higher, on the weight basis, than that from sound wood. This fact is in accord with observations made by Johnsen and Lee[7] and is not surprising in view of the comparatively high cellulose content of the decayed sample. (See Table 3.) The density of the decayed wood was, however, sufficiently lower than that of the sound wood to show a reduction of yield on the volume basis.

When considering the yields obtained it must be remembered that in these cooks all the wood except the knots was cooked. In the usual mill operation, however, some of the weakened portions of the wood will be mechanically disintegrated and lost. Wood containing sap rot will suffer a loss when passing through the barking drums. Wood containing either sap or heart rot or both will suffer a further loss in friable material in chipping and screening. The tendency will be, therefore, to increase the proportion of sound wood that goes into the digesters, and to throw the loss on the wood room operations rather than on the cooking operation. In mill operation, in comparisn with the results obtained in this investigation, the final effect will be lower yields per cord, little or no change in the yields per digester, and better quality of pulp because of the greater proportion of sound wood reaching the digesters.

Strength of Pulps—The strength tests on the pulps, results of which are given in Table 2, are very encouraging. In the unbeaten state (20 minutes in the ball mill to open them up) the pulps from the decayed woods show a strength which with the exception of that from *Trametes pini*, is not appreciably lower than that of pulp from sound wood. The strength of the pulp from *Trametes pini* was not so far below that of

[7] Bjarne Johnsen and H. N. Lee, Pulp and Paper Magazine of Canada, Vol. 21, p. 112, 1923.

normal commercial pulps as to preclude its satisfactory use for newsprint. The behavior on beating, however, was different, inasmuch as the pulps from the decayed woods hydrated rapidly to a parchment, the strength reached a maximum quickly and fell off rather rapidly.

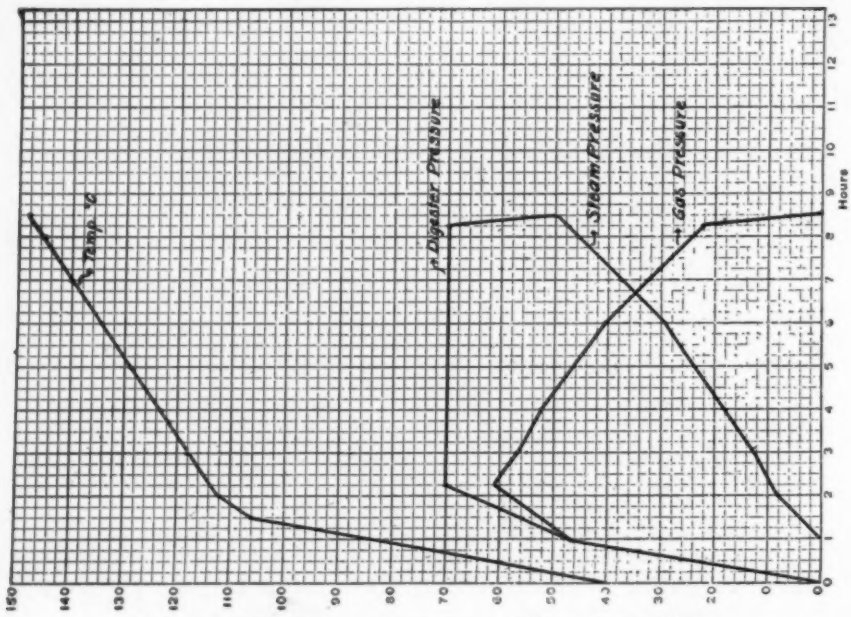

Fig. 8. Temperature and pressure curves followed in the pulping tests

In the manufacture of newsprint, however, beaters are rapidly being displaced by mixers, consequently, the initial strength of the pulp is of more importance than the strength that can be developed with hydration.

Color of the Pulps—The chief objection to the pulps made from the infected wood is to be found in their poorer color. This darkening was roughly proportional to the degree of discoloration of the wood, but in no case was the color worse than that of hemlock sulphite used regularly in middle western news mills.

Properties of the Woods and Their Relation to Pulping Value

The measure of the practical utility of a bolt of pulpwood is the yield and quality of the pulp that can be obtained from it.

Firmness of the Wood—From a study of Table 1, in which the samples are listed in the order of the decreasing firmness of the wood, there is evident some parallelism between decrease in firmness and decrease in yield; the greatest loss in yield is obtained from the wood which shows the greatest loss in firmness. Had the wood been prepared under mill conditions still greater reduction in yield would doubtless have occurred, as already pointed out, because of the mechanical losses incident to wood room operations.

No accurate method is now available to measure and record the degree of firmness of the wood. The parallelism between this property and the yield indicates the need for the development of some simple method of measurement which can be used to aid the scalers and inspectors in their selection and evaluation of pulpwood for sulphite pulpwood.

Density—There are several factors, however, that render density as a laboratory test a somewhat unreliable indicator of degree of decay. Sound wood varies greatly in density from tree to tree and a large number of determinations are necessary to arrive at a true average. These variations may be greater than the differences in density between sound and decayed wood; variability in volume of the wood with changes in moisture content is also a disturbing factor. Evidence is still lacking furthermore, to prove a direct parallelism between density and degree of decay. The data in Table 1 indicate that insofar as the samples included in this investigation are concerned, such a general parallelism does not exist.

Discoloration of the Wood—The volume of discolored wood, as compared with the total volume, Table 1, is clearly not an indication of the possible yield of pulp and should not be taken as a measure of the degree of rot or of the pulping value of the wood except that the amount and intensity of discoloration may to some degree be reflected in a darkening of the pulp.

Chemical Properties—Some of the chemical properties of the wood are shown in Table 3, in which the samples are arranged in the order of decreasing firmness of the wood. For purposes of comparison this table also includes the yields of pulp obtained from the various samples of wood.

In all cases the solubility in alkali is higher for the decayed than for the sound samples. In the cases of advanced stages of decay, as represented by "hemlock heart rot" grade 3, and *Fomes pinicola*, there is a good parallelism between the increase in solubility in alkali and the degree of rot as indicated by the decreased firmness of the wood and by the decreased yield of pulp. Decrease in cellulose content in these cases reflects the same changes in degree of rot. For the three grades of "hemlock heart rot" the cellulose content of the wood is nearly uniform, otherwise the same relationship holds also for this type of decay.

Spruce rotted by *Trametes pini* shows an increase in solubility in alkali but an increase also in cellulose content and in yield of pulp. The pulp, however, as already pointed out, was the weakest of all those obtained in this investigation. Solubility in alkali does, therefore, give some indication of the reduction in pulping value.

It is doubtful whether a definite relationship between chemical properties and degree of decay in general can be established. The relationship must in all probability be considered with reference to the specific type of decay. The data so far obtained and the importance which such a relationship would have in furnishing a reliable means of evaluating pulpwood warrant its further and intensive investigation.

Table 3.—CHEMICAL PROPERTIES OF THE WOODS
The samples for each species are listed in order of decreasing firmness of wood.

Sample No.	Fungus	Volume of discolored wood, percent	Solubility in 1% sodium hydroxide, percent	Lignin, percent	Cellulose, percent	Yield of screened pulp
	BALSAM					
975-0	None	None	9.3	30.7	57.1	49.6
975-3	"Hemlock heart rot" grade 1.	55	13.6	31.8	53.9	51.0
975-4	"Hemlock heart rot" grade 2.	74	14.1	30.8	53.9	48.9
975-1	Mixed feather rots	31	11.9	31.8	54.8	50.6
975-6	Polystictus abietinus	66	13.3	30.0	54.0	49.1
975-5	"Hemlock heart rot" grade 3.	100	17.6	28.7	53.5	45.6
975-2	Fomes pinicola.	69	20.6	34.45	49.7	40.0
	SPRUCE					
963	None	None	10.4	28.4	58.4	45.7
975-7	Trametes	96	15.6	25.8	59.8	51.1

Summary

1. The samples of wood investigated, with the exception of "hemlock heart rot" grade 1, were so badly decayed that,

[8] Acknowledgment is made of the helpful assistance of M. W. Bray, Chemist in Forest Products, Forest Products Laboratory, Madison, Wisconsin, under whose direction the chemical analyses were made.

Table 2.—STRENGTH OF PULPS DETERMINED BY THE BALL MILL BEATING METHOD
Sample in each species arranged in order of decreasing firmness of wood. Figures at top of columns indicate minutes in ball mill.

Sample No.	Fungus	Volume of discolored wood	Bursting strength			Breaking length			Double folds			Tear		
		Percent	20	40	60	20	40	60	20	40	60	20	40	60
			Per lb. ream			Meters			Number			Grams lb. ream		
						BALSAM								
975-0	None	None	0.93	1.02	1.04	3625	4480	4353	4765	3234	1783	2.20	2.15	2.38
975-0	"Hemlock heart rot"—grade 1	55	0.93	0.99	1.04	4670	4292	4230	4681	1812	1998	2.34	1.95	2.45
975-4	"Hemlock heart rot"—grade 2	77	0.97	1.06	1.10	4411	5561	5300	1813	1383	933	1.94	1.77	2.01
975-1	Mixed feather rots	31	1.09	1.22	1.23	5986	5571	4871	1701	1603	1479	2.27	2.26	2.29
975-6	Polystictus abietinus	66	0.87	0.95	0.99	3393	4340	4405	3156	2120	2066	2.02	2.09	2.21
975-5	"Hemlock heart rot"—grade 3	100	0.91	1.03	0.97	4632	4336	4175	553	633	909	1.90	1.48	2.78
975-2	Fomes pinicola	69	0.91	0.88	0.66	3507	2708	2339	1014	787	295	1.63	1.73	1.73
						SPRUCE								
963	None	None	0.80	1.05	1.11	3355	4372	4090	459	1102	1141	2.46	2.62	2.50
975-7	Trametes pini	96	0.077	0.95	1.11	3075	4520	4073	726	910	772	1.97	1.81	1.89

at least in the region from which they were obtained, they probably would have been culled by the scaler, and left in the woods.

2. The pulps obtained from these woods cooked for news grade sulphite, with the exception of that from *Trametes pini*, are not materially weaker than those from sound wood. The strength of the pulp from *Trametes pini* was not so far below that of normal commercial pulps as to preclude its satisfactory use for newsprint.

3. The color of pulps made from infected wood may be poorer than the color of these made from sound wood, the darkening being roughly proportional to the intensity of the discoloration of the wood.

4. The yields obtained from the infected wood both on the weight and the volume basis were not materially lower than those from sound wood, except in cases in which the wood had become materially softened or friable.

5. Wood softened or friable to such a degree as to give abnormally low yields of pulp would largely be eliminated in the wood room operations. Commercial yields per cord from decayed wood will therefore probably be lower than those from sound wood in proportion to the amount of wood so badly weakened that the decayed portion will not withstand wood room operations.

6. Some parallelism has been shown between the degree of firmness of the wood and its pulping value, the wood softened to the greatest extent by decay having suffered the greatest loss in pulping value.

7. Density of the wood is not in general a reliable indication of the pulping value.

8. The amount and intensity of discoloration of the wood may indicate lower color of the pulp but does not necessarily indicate other pulping values.

9. The solubility of wood in 1 per cent alkali may prove helpful in evaluating decayed pulpwood. Further investigation is necessary to establish the limitations to its application.

10. The lignin and cellulose contents of the wood are not in themselves reliable indications of pulping values but may prove valuable aids in connection with alkali solubility and degree of firmness.

Grateful acknowledgment is made of the assistance of the Newsprint Service Bureau which assumed a portion of the expense of this investigation.

New Junk

Leaves, twigs, small branches of trees, waste from the cutting of sawlogs and timbers, sawdust and other wood waste, that heretofore has been thrown away as useless, is being changed as by magic into boards, beams, mouldings and all forms in which lumber usually appears and many forms in which wood has never before been used, says the New York State College of Forestry at Syracuse.

Synthetic wood is not exactly like lumber in appearance. Most of it bears a close resemblance in color to common pasteboard. Its texture is much finer. For many purposes it is said to be more serviceable than natural wood especially for interior construction. The products of the pulp and paper industry are being manufactured through chemical and mechanical processes to take the place of many metal, leather and hard rubber articles. This is especially true of vulcanized fiber, a substance as hard as iron, light as aluminum, easy to work and impervious to water.

Another kind of converted wood called binder-board is made from hardwood waste. This is being used in automobile bodies by one of the leading manufacturers. Hardwood scraps from every department of the plant are gathered, put through a chipping machine and made into chips. The chips are then mixed with a caustic soda solution which produces pulp. This pulp is run through washers and then under great pressure is formed into binder-boards or any other size and shape that may be required. The boards are then ready to use in making car bodies and other construction purposes. This artificial lumber also has good waterproof qualities and insulation against heat and cold it is also said to be less subject to checking and splitting than natural wood.

The day may come when junk dealers will be collecting sawdust, old boards, broken-down furniture, remnants of boxes, barrels, baskets, leaves, twigs, etc., to be re-manufactured into new lumber.

Who Made the First Paper?

Who made the first sheet of paper? The credit for this achievement, according to the American Forestry Association, is due to a scholarly eunuch named Ts'ai-lun, of China, a member of the court of the Han dynasty, in the year 75 A. D. For his achievement, Ts'ai-lun was, forty years later, raised to the rank of marquis. It appears that Ts'ai-lun, believing that old bamboo tablets and stylus had outlived their usefulness, set for himself the task of making new writing materials. After thirty years he produced the first hand sheet of paper, and it was made from the bark of a mulberry tree.

Prior to Ts'ai-lun's day, leaves of trees and various barks used in crude form had served the Egyptians, Romans and other nations as paper. Ts'ai-lun, however, did not use the crude inner bark of the tree as the final material on which to make his records. He did use the bark, but merely as a raw material from which he produced a finished sheet of paper by a series of processes which, crude as they may seem today, were the forebears of paper manufacture today.

For eight centuries after Ts'ai-lun's discovery, China monopolized the art of paper making. She managed to keep the process secret until it was captured by the Arabs, who improved upon it by forsaking the mulberry tree and using linen or cotton rags instead. Thus wood, as a raw material for paper making, passed into oblivion until the dawn of the nineteenth century. Even up to 1860, rags were the principal material used in paper making.

Most books on paper making date the first wood pulp process from 1840, but the American Forestry Association cites evidence to show that it was forty years earlier. A quaint little volume, dedicated to George the Third, was printed in London in 1800. The writer of the book was one Mathias Koops. Most of the pages of the book are made from straw, but the appendix appears quite different, and as to it, Koop says:

"The following lines are printed on paper made from wood alone, the produce of this country, without any intermixture of rags, waste paper, bark, straw, or any other vegetable substance."

What wood Koop used, or what process he employed, is not known, but it is now historically conceded that he made paper from wood pulp, forty years before the ground wood process was officially discovered.

Sweden's Paper Industry

History of the Remarkable Rise in the Paper Industry in Sweden Since 1890

By A. BOGENHOLM SLOANE, A. B. A. M.

THE first paper mill in Sweden was built by bishop Hans Brask in Upsala, 1520, and in 1850 the country had eighty paper mills, but it was not until wood fiber became the principal raw material for the production of paper that the industry developed an export surplus. Many of the small paper mills were shut up during the latter part of the past century and in the year 1890 only forty were running. During this time the principal material shifted from rags to wood fiber and the pulp industry developed. Several new mills were built and equipped with machinery for their manufacture of paper from pulp and during the last ten years of the past century Sweden began to export wrapping and print paper.

In 1900, Sweden had a paper industry comparable with that of the United States. During the next ten years only a few mills were constructed but the industry was strengthened through technical improvement and co-operation between respective managers in marketing the product. The greatest development of the Swedish paper industry, however, took place during the period 1911-1920.

Production of Cardboard and Paper During the Period 1891-1920

Years	Number mills	Number laborers	Output tons	Value in 1,000 kronor
1891-95	54	4,579	48,037	12,023
1906-10	69	7,829	228,641	46,598
1913	72	9,314	332,956	66,861
1918	78	9,600	293,803	231,849
1919	75	9,864	281,666	182,740
1920	79	12,319	400,074	350,488

Within the cardboard branch of the industry, both the old mills and three newly built, installed modern cardboard machines and two mills which manufactured wrapping paper increased their capacity materially. Several small mills were built near Gothenburg, a location equally advantageous to the export of the product and the import of wood.

The World War, with the increased demand especially for the kind of paper known as spinning paper used in textile production during the years 1916-1918, caused a great upswing in the industry and nine new mills were built during the period 1917-1920, mainly for the manufacture of wrapping and print paper.

This improved condition did not, however, refer to manufacturers of writing paper. These producers had never had a surplus for the export market and the comparatively low prices fixed for the home market held the value of their whole output down, while they affected but slightly the manufacturers of wrapping and print paper who worked mainly for exports. For this reason no great extension in the production of writing paper has taken place.

The table below shows the machinery in the various mills and their output, 1890-1920:

Years—	Number mills	Output tons	Number laborers	Working widths of machines	Average yearly production in tons: Per mill	Per laborer	Per meter machine width
1890.....	22	34,100	3,100	82.45	1,550	11.0	414
1900.....	39	107,800	5,600	190.00	2,764	19.2	567
1910.....	46	250,100	7,200	295.10	5,437	34.8	848
1920.....	60	386,300	11,200	417.30	6,438	34.6	926

As the working width of the machines means more to the output than their number, that width has been given in the above table, the number of complete paper making machines has increased from 48 in 1880 to 179 in 1920, or 273 percent, but the aggregate working width increased from 83.45 meters to 417.30 meters or 406 percent. The table shows that the saving of human power has increased more rapidly than the production power per meter working width of the machines.

In regard to organization, the Swedish paper industry shows no trust formation, but on the other hand consolidation of less intense forms are represented. There are ten horizontal combinations of, in all, twenty-one paper mills with complete paper machinery. Six of the ten combinations are of about the same size, each having an aggregate working width on their machines of 25-29 meters. The corresponding figures of the remaining are 8½-17 meters. Two of the combinations produce mainly print paper, two wrapping paper, and the others have a mixed production.

The small number of mills in each combination indicates that a monopoly of the market has not been the reason for the formation of the combines. It is believed that the advantages in common administration, and disposal of power and raw materials has been the motive for combination in four cases. Four are probably due to reconstruction of pulp mills to paper mills on account of the fluctuating conditions on the pulp market. In two of the remaining cases, with specialization in print and wrapping paper, respectively, the advantages of common marketing have been so marked that they have possibly decided the consolidation.

In 1913 about 9,182 tons of rags were used in Swedish paper production. This corresponded to 5,500 tons of paper, or 1.7 percent of the total paper production. In the remaining quantities of the output the raw material consisted almost entirely of wood pulp or cellulose. During the period 1913-1917 pulp, manufactured by the paper factories themselves, was used in 73-78 percent of the production. As the loss of fiber during the process of manufacture on the average is balanced by the addition of fillings, it may be assumed that about three-fourths of the paper manufacturers use their own pulp for paper they manufacture. In 1920 only 5 percent of the total paper production of the country came from the thirteen, of the total of seventy-seven paper mills, which are not combined with pulp mills.

The organization of cartels within the Swedish paper industry should be of importance not only for the industry itself but for the general trade balance of the country. Sweden's position as one of the world's greatest paper exporters might make it possible for the leaders in that industry to influence the prices on the world market. The tendencies to co-operation in this regard which have appeared in Sweden have been preceded by corresponding movements in other countries with a similar position on the world market, which gives added importance to the results of the Swedish combination.

The central organization of Swedish paper mills, "Svenska Pappersbruksforeningen" has made efforts to bring about uniform rules for sales within the paper industry as a whole but has not influenced the fixation of prices.

Agreements in regard to uniform prices have originated in the sections of the organization where the producers of similar kinds of paper work together. Such sections have been formed for sulphate paper, sulphite paper, grease proof paper, writing paper, print paper, Havana paper, cardboard, handmade paper, and artificial leather. The price cartels which have existed within the various sections have carried a form of agreement which has been binding through the signatures of the members. These concentration tendencies have, however, been somewhat different for the export and the domestic market.

Among the combines for the export market, it is only the sulphate section which has had a continuous existence since the beginning of the present century. The others have worked more or less sporadically. Through various agreements during the period from April, 1919, to April, 1920, the producers of sulphate, sulphite, grease proof papers and cardboard have accepted similar cartel rules. In these agreements a minimum price is fixed which can be changed by a qualified majority at a meeting of the sections. Sales must be reported each week to the Association of Paper Producers. The carrying out of the agreement is controlled by authorized auditors. Breach of the agreement is punishable by indemnities. This agreement included Swedish, Norwegian and Finnish manufacturers of cardboard, and Swedish and Norwegian producers of sulphate and sulphite paper. Any member could withdraw from the combine after forty-five days previous notice. It was, however, impossible to carry out this combine during the crisis which started in the autumn of 1920. The

agreements for the cardboard and grease proof paper industries were abolished in January, 1921, and for the sulphate and sulphite paper industries in April of that year. Of the export combine nothing remains except the sales statistics which are based on the reports to the Association of Paper Producers. The combine for the domestic market has, however, continued with better co-operation.

The price cartels were unable to carry out any permanent price advances up to the beginning of the war and prices declined notwithstanding the continual increase in the cost of production. The importance of the cartels lay in the fact it enabled the producers to utilize the tariff protection and to carry through the price reduction in a rational way, based on the size of the orders. After the outbreak of the war up to the end of 1920 the combine between the paper producers was of little importance for the fixation of prices on paper, since the scarcity of supply counteracted the effects of both domestic and foreign competition. The uniformity in prices and sales conditions gave, however, stability to the market which during this period was absent in other branches of industry.

The only syndicate which at present exists within the Swedish paper industry is that of the producers of print paper, in March, 1917. This includes factories whose yearly production capacity amounts to 150,000 tons, while factories with a production capacity of 30,000 tons a year are independent. This syndicate has had a considerable effect on the prices and the domestic prices, as a rule, have been held below those on the export market.

The Cooking of Sulphite Cellulose*

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Some comparative data of results, production, efficiency and economy, of different methods of cooking sulphite cellulose in different countries.

THE scope of this paper is an endeavor to throw some light on the always active questions, which country produces the best pulp and which method of cooking gives the best results. It is an old story that two mills can never make the same kind of pulp, and it is often heard around mills that different digesters yield different pulp. The more the "rule of thumb" methods are replaced by definite control and the more knowledge we gain of the fundamentals of the process, the sooner will this be proved to be only a delusion.

In this paper is a comparison of the different methods of making sulphite pulp, with a discussion of their differences and their bearing on the quality of the product, the relative efficiency of the methods and their economy. The material used in this paper was collected in 1923 during several months' stay in Sweden and Finland. The data from the mills in those countries are average figures for long periods of time, and without claiming that the average figures tabulated in the condensed tables, are the absolute conditions of the different methods in the different countries I believe that they give a fair illustration of the existing conditions.

Of the data for the American mills some are from personal experience and some were obtained through the courtesy of W. G. MacNaughton of TAPPI, O. L. Berger of the G. D. Jenssen Company, and Stebbins Engineering & Manufacturing Company, to whom I wish to express my gratitude for the valuable information received.

The data obtained are tabulated so that an analysis can be made as to the factors influencing the results, and are tabulated in average condensed tables according to cooking methods, country, species of wood cooked, and grade of pulp made. From these average tables the conclusions are drawn.

There has never been published, so far as I know, a comparison of the methods for making sulphite pulp in different countries although numerous papers have been given on individual conditions.

In this paper three different methods for making sulphite pulp are discussed:

(1) Mitscherlich method.
(2) Ritter-Kellner method.
(3) Quick Cook method.

It is always claimed that the Mitscherlich method compared with Ritter-Kellner, and the Ritter-Kellner compared with the Quick Cook gives:

(1) Higher yield.
(2) Lower consumption of raw materials.
(3) Stronger pulp.
(4) Cleaner pulp.

*Presented at the Annual Convention of the Technical Association of the Paper Industry, April 10, 1924, at New York City.

The yield and the consumption of raw materials are discussed in this paper, but the qualities of the pulp will be taken up at a later meeting of the Association.

In the study of these three methods I have selected mills in Sweden, Finland, United States and Canada; Sweden representing the Mitscherlich method, Finland the Ritter-Kellner, and United States and Canada the Quick Cook method.

General Observations

In Sweden 72 per cent of all sulphite pulp is cooked according to the Mitscherlich process, in Finland 94 per cent is cooked by the Ritter-Kellner method, and in United States the Quick Cook method is most frequently used.

The Ritter-Kellner and the Quick Cook are in reality similar methods. The latter is derived from the former but in many respects is quite different. The Ritter-Kellner process has many points of similarity in operation and procedure to those found in the Mitscherlich process, but which are eliminated in the Quick Cook, making this last more efficient in many ways and saving in time. The "gassing" of the digesters, the liquor draining, the washing of the pulp in the digesters, and the dumping are characteristic procedures of both the Mitscherlich and the Ritter-Kellner methods, while the steaming and refilling of chips are characteristics of the Mitscherlich process only and the blowing of the entire digester charge is used only in the Quick Cook. The principal difference between the Mitscherlich process on one hand and the Ritter-Kellner and the Quick Cook on the other, is that the steam for cooking in the first is applied indirectly, while in the last two the steam is admitted directly into the digester.

In order to illustrate these three methods a short explanation is given of the conditions in three mills using each of these methods, namely:

(1) A Mitscherlich mill, one of the finest in Sweden, making a world-famous brand of strong sulphite.

(2) A Ritter-Kellner mill, which is a new up-to-date mill in Finland, making both easy bleaching and strong pulp for export.

(3) A Quick Cook mill in United States making strong pulp for news, which has developed the Quick Cook to a very high standard of efficiency.

The practices of seasoning the wood are as follows:

1. A Mitscherlich mill seasons its wood so that when used the outer wood and the bark are dry enough to be used economically as fuel, the wood cooked having a moisture content of about 40 per cent. This requires about 5 to 7 months' time.

2. A Ritter-Kellner mill endeavors to get the wood as dry as possible and as a rule seasons its wood about 1 to 1½ years.

3. A Quick Cook has unfortunately no definite system of seasoning the wood and this is one of the main reasons why the sulphite is so variable in different mills using this method of cooking.

The Mitscherlich Mill

The wood cooked in this mill is the spruce grown in northern Sweden (*Picea abies*). After a thorough cleaning and chipping, the chips are conveyed to chip bins above the digester. The digester is filled with chips to the top and when full the cover is loosely put on. The steam valve in the top of the digester is opened and the steam is allowed to pass through the chips. When the steam comes through the bottom valve of the digester it is turned off, the cover is removed and more chips are put into the digester.

This steaming takes about 30 minutes for a digester of 5,297 cu. ft. volume and about 10 to 12 per cent of the digester volume is gained by the steaming. In fact, tests made at the mill in question have shown that without steaming and refilling with chips 13.5 United States tons are obtained per digester as compared with 14.9 tons with steaming, which tends to show that a Mitscherlich cook without steaming does not give a higher yield per digester volume than cooking with direct steam. When the digester is again filled to the top, which takes about 15 minutes, the cover is bolted on and steam is again admitted at the top for about 15 minutes.

A better practice employed in many mills is to steam the chips from the bottom while filling the digester. This saves time and it seems as if a higher degree of packing is obtained, judging from the yield figures per digester volume from the mills using this method of steaming. (See table VI, Mills No. 2, 3, and 5.)

The steaming from the top, however, will do a more thorough job in some ways than steaming from the bottom, as the steam has a tendency to distribute more evenly in the digester and consequently more air is driven off than when the steaming is done from the bottom while filling with chips.

The advantages of steaming the chips are as follows:

(1) The air is expelled from the digester and the chips.

(2) A gain in digester space of 10 to 12 per cent by which a larger charge of chips is possible.

(3) When the acid is pumped into the steamed digester a vacuum is created by condensation causing a more thorough penetration of the chips by the acid.

(4) A uniform moisture content of the wood is secured.

(5) The digester contents are rapidly supplied with heat.

The acid is now pumped in and for a digester of this size, 3,354 cu. ft. of cooking acid are used. At the mill in question the cooking acid is a mixture of raw acid and reclaimed acid so balanced that the free SO_2 in the mixture is 3.00 per cent. Table 1 shows the composition of the raw and reclaimed acids and the portions of each taken for charging the digester.

TABLE 1—COMPOSITION OF THE ACID FOR COOKING
(Mitscherlich)

Reclaimed acid			Raw acid			Mixture			Acid used	
Total %	Free %	Comb. %	Total %	Free %	Comb. %	Total %	Free %	Comb. %	Recl. cu.m.	Raw cu.m.
4.16	3.04	1.12	2.75	1.67	1.08	4.18	3.00	1.08	92	3
5.08	3.78	1.30	2.75	1.57	1.18	4.18	3.00	1.18	61	34
4.13	2.88	1.25	2.37	1.38	0.99	....	....	....	95	..
4.48	3.20	1.28	3.30	1.76	1.44	4.30	3.00	1.30	82	13
4.32	3.26	1.06	2.52	1.38	1.14	4.07	3.00	1.07	82	13
3.94	2.94	1.00	2.04	1.25	0.79	4.00	3.00	1.00	95	..
4.48	3.36	1.12	2.72	1.52	1.22	4.14	3.00	1.14	80	15

As soon as the acid has risen over the steam coils the steam is turned on. On account of the pre-steaming, the temperature of the acid is increased from about 35 to 75 deg. C. To fill with acid a time of 30 minutes is required, after which 530 cu. ft. of liquor from a digester ready for dumping are put in. This drawing of liquor takes 16 to 18 minutes, making the total charge of cooking liquor 3,884 cu. ft. The liquor taken over has a temperature of 135 deg. C. Many mills instead of taking over liquor at 135 deg. C., take liquor from a digester at 110 degrees C. before the dissolving action of the liquor takes place. Quantities ranging from 500 to 700 cu. ft. are circulating from digester to digester, and besides a saving of steam a saving of sulphur is claimed, in one case being as high as 100 lb. of pyrites per ton of pulp. The steam for cooking is used indirectly by means of four sets of copper coils 1¼ in. in diameter, of a total length of 300 meters (1,000 ft.). Live steam of 85 to 110 lb. pressure is used on all sets under a back pressure of 40 lb. The condensed water is used for boiler feed.

Following is the progress of a normal cook which illustrates the taking up of temperature and pressure.

PROGRESS OF A MITSCHERLICH COOK

Cooking time hr.	Gage pressure lb.	Temperature °C	Remarks
0	0	70	
1	14	75	
2	17	85	
3	20	95	
4	25	100	
5	28	105	Digester closed
6	30	106	
7	31	107	
8	32	108	Digester opened
9	42	115	
10	50	120	
11	54	125	
12	57	130	
13	57	134	Digester closed
14	57	135	
15	57	135	
16	57	135	

The temperature is increased to 105 deg. C. after 5 hr. and at this temperature the digester is closed for 3 hr. The temperature reaches 130 deg. C. after 12 hr. and the cooking is finished at 135 deg. C., and 57 lb. in 16 hr. with an acid of about 1.10 per cent combined. To determine the endpoint of the cook, besides the smell and the color of the liquor, the Mitscherlich test is applied. The liquor at the end of the cooking tests about 0.37 per cent SO_2. The top relief is now opened and the digester is relieved until about 14 lb. pressure is reached. Then the liquor is drained off. This procedure takes about 2 hr. After the gassing the liquor tests 0.10 per cent SO_2 with iodine.

Some mills reclaim more of the gas by taking the discharged liquor through a liquor pot, where more gas is recovered by putting the liquor under a slight vacuum created by pumping reclaimed acid through an injector connected with the liquor pot. The recovery, however, is so small that it hardly warants the installation of the pumping system. Some liquor is frequently taken over to a freshly charged digester.

The liquor is either wasted or used for alcohol recovery. In the latter case it is pumped to a neutralizing tower, where it is neutralized with lime or lime sludge from the sulphate process.

In Mitscherlich mills allowing the liquor to circulate from one digester to another as described, the spent liquor has a sugar content in some cases as high as 2.50 per cent. At some plants the spent liquor is evaporated to 50 per cent solids and used as fuel. This pays for itself but gives no excess saving.

After draining the digester is filled with water and the entire charge dumped into an open pit where the pulp is finally washed. From the pit the pulp is conveyed to separators where the fiber bundles are broken up. It is then taken over knot catchers, diluted and screened.

The Ritter-Kellner Mill

The wood cooked in this plant, like the Mitscherlich mill, is spruce. A table is given showing the weight per unit volume of this wood.

TABLE 2—WEIGHT PER VOLUME OF FINLAND SPRUCE

Wt. per cu. m., kg.	Water content, %	Wt. cu. m. air dry kg.	Wt. per cord air dry, lb.
394	20.8	346	2,755
393	19.9	350	2,800
406	21.1	356	2,850
377	20.33	327	2,615
408	26.9	331	2,655
384	21.0	337	2,690
406	21.1	356	2,850
Average	....	343	2,746

Six stationary insulated digesters of 7,519 cu. ft. volume each are used. The steam for cooking is exhaust steam from turbines at a pressure of 90 lb. and with superheat of 200 to 250 deg. C.

TABLE 3—RATE OF DISAPPEARANCE OF SO_2 AT DIFFERENT DIGESTER TEMPERATURES

Temp. °C	Comb. SO_2 in the acid %	SO_2 in the liquor at the closing of the digester % a	SO_2 in the liquor at the end of the cook % b	Line closed hr. c	Rate of disappearance of SO_2 per hr. in % of SO_2 in the liquor at the closing of the dig. 100 (a-b) / c x a
126—129	1.15	0.81	0.25	10:00	6.9
130	1.16	1.03	0.39	12:00	5.1
131	1.15	0.67	0.26	9:00	6.9
132	1.12	1.07	0.20	7:00	11.8
133	1.12	0.80	0.24	8:00	7.3
133	1.21	1.01	0.20	8:00	7.9
133	1.15	0.62	0.23	4:40	15.1
134	1.12	1.13	0.23	7:30	10.6
135	1.18	1.10	0.31	6:00	11.8
135	1.19	0.84	0.28	7:30	8.8
131—138	1.18	0.87	0.26	7:50	9.0
137	1.12	1.12	0.30	5:40	14.1
136—138	1.15	1.25	0.54	5:00	11.1
138	1.12	1.08	0.31	6:00	11.6
137—144	1.16	0.85	0.50	2:50	15.0
135—144	0.99	0.98	0.28	4:00	17.7
142	1.15	0.90	0.52	2:30	16.8
140—143	1.15	0.93	0.37	3:30	17.2
140—143	1.18	0.98	0.36	4:00	16.2
145—147	1.28	0.80	0.33	2:15	25.8

The chips are injected into the digester with steam. The acid is pumped in from the bottom, and the digester is filled to the top with 5,472 cu. ft. of acid per cook. The steam is supplied by means of two 3 in. pipes. The direct cooking method is used. The cooking is done as follows:

The digester pressure is taken up to 60 lb. in 2 hr., after which the top relief is opened sufficiently to raise the temperature to 100 deg. C. for 1 hr. or more depending on the moisture content of the chips. The steam and relief valves are now opened again and the temperature is raised to 135 deg. C. after 8 or 9 hrs. at a pressure of 65 lb. gauge. The iodine test at this point in the cooking is expected to indicate about 1.10 per cent SO_2, when an acid testing about 2.90 per cent free and 1.05 per cent comb. SO_2 is used. The digester is now closed and kept at this temperature and pressure until the color and the odor of the liquor indicates that the pulp is of the quality desired. The iodine test of the liquor shows about 0.30 per cent for easy bleaching pulp or 0.50 per cent SO_2 for strong. This requires about 5½ to 6¼ hr. from the closing of the digester. It is interesting to note the relation between time required for finishing the cook and the temperature at this closing of the digester. Table 3 and Fig. 1 cover the disappearance of the SO_2 and time required to finish the cook at different temperatures ranging from 126 deg. C. to 147 deg. C. The rate of disappearance of the SO_2 is expressed in per cent of SO_2 in the liquor at the closing of the digester.

A curve (Fig. 1—following page) is plotted with the temperature as abscissa and the rate as ordinate. The two extremes of temperature shows that when the digester is closed at 126 deg. C., 10 hr. are required for the cook to go out as compared with 2:15 hr. at a temperature of 145 to 147 deg. C.

The top relief is now opened and the gas let off until the pressure has dropped to 28 lb. At the beginning of this "gassing" the vapors leaving the digester hold about 35 per cent SO_2, at the end 14 per cent. About 740 lb. SO_2 is recovered per cook by this procedure. When the pressure is down to 28 lb. water is pumped into the digester through the top valve, at the same time as the liquor draining valve is opened in the bottom of the digester and the pulp is in this way washed in the digester. When the pressure has dropped to zero, the bottom cover is opened and the pulp dumped into a concrete pit. Pulp remaining in the digester is hosed out with water. Similar to the Mitscherlich process, the pulp is taken through a separator before screening.

Below is the progress of a typical cook at this mill:

PROGRESS OF A RITTER-KELLNER COOK

Cooking hr.	Pressure lb. gage	Temp. °C	SO_2 %	Remarks
0	0	35	3.71	
½	1.9	70	3.63	
1	2.6	75	3.12	Top opened after 1:50 hr.
1½	3.25	80	3.15	
2	4.20	88	3.11	
2½	3.70	84	2.78	
3	3.30	91	2.43	
3½	3.40	100	2.26	
4	3.95	105	2.18	
4½	3.50	110	2.06	
5	3.25	113	1.88	
5½	4.60	121	1.60	
6	4.15	127	1.41	Steam and relief closed
6½	4.25	132	1.20	
7	4.40	136	1.14	
7½	4.60	138	1.06	
8	4.80	138	1.00	
9	4.80	138	....	
10	4.80	138	....	
11	4.80	138	....	
12	4.80	138	....	
13	4.80	138	....	
14	4.80	138	....	
14½	4.80	138	.54	"Gassing" started
15½	2.00	127	.14	

The Quick Cook Mill

The wood cooked in this mill is exclusively hemlock grown in northern Wisconsin. Table 4 and 5 show the weight per cord of this wood and the analysis of the same from three different localities.

TABLE 4—WEIGHT PER CORD OF WISCONSIN HEMLOCK

	Wood in its entirety			Wood cleaned for pulp making		
Locality	Wt. per cord wet lb.	Moisture content per cent	Wt. per cord air dry lb.	Wt. per cord wet lb.	Moisture content per cent	Wt. per cord air dry lb.
1.....	3,814	40.8	2,510	3,754	41.9	2,432
	3,827	39.3	2,579	3,651	43.3	2,300
	....	....	....	3,730	42.5	2,383
2.....	4,359	42.9	2,764	4,145	45.2	2,524
	4,468	41.9	2,887	3,737	44.6	2,298
3.....	4,568	51.2	2,465	3,604	40.3	2,389
	....	....	....	3,722	42.8	2,367

Average, 2,641 lb. per cord.

TABLE 5—ANALYSIS OF WISCONSIN HEMLOCK

Locality	Cold water soluble %	Hot water soluble %	Soluble in 1% NaOH %	Soluble in 7.14% NaOH %	Ether soluble %	Benzine soluble %	Cellulose %	Lignin %	Copper No.	Ash %
1.....	3.10	5.60	15.10	21.10	1.44	5.90	53.3	34.9	6.65	0.37
2.....	3.07	5.81	18.74	23.60	1.11	7.48	53.0	34.2	6.91	0.51
3.....	2.81	5.41	14.21	23.05	1.51	5.33	52.0	36.1	6.34	0.70

After cleaning and chipping, the wood is transported to ordinary chipbins and the chips are filled in the digesters with steam. The digesters are 4.400 cu. ft. capacity and to fill one digester 25 min. is required.

When full the acid is pumped in which takes about 15 min. The steam which has a pressure of 160 lb. and is saturated is now turned on full and the pressure in the digester is taken up to 90 lb. in about 30 min. At this pressure the temperature has increased to about 90 deg. C. and the digester is then closed for 2 hrs. The top relief is then opened and the pressure allowed to drop to 80 lb. where it is kept during the entire cooking. The side relief is used until the temperature has gone up to 135 deg. C., which generally takes 6 hrs. after the turning on of the steam. The digester is now set on dry gas and the cook is blown at a temperature of about 155 deg. C. after 8 hr. cooking at a test of the liquor of 0.15 to 18 per cent SO_2. Below is the average pressure, temperature and concentration of the SO_2 at different length of cooking at this mill.

PROGRESS OF A QUICK CURE

Cooking hr.	Pressure lb. gage	Temp. deg. C	SO_2 per cent	Remarks
0	0	37	4.86	
½	90	95	2.85	Digester closed
2½	90	95	2.35	Relief started
3	80	95	2.20	
3½	80	97	2.04	
4	80	104	1.94	
4½	80	111	1.69	
5	80	119	1.45	
5½	80	128	1.27	
6	80	135	1.01	
6½	80	142	0.78	Dry gas
7	80	147	0.54	
7½	80	153	0.22	
8	80	155	0.15	

In order to make a comparison of the results of the different methods in the different countries, the following information has been collected regarding the production of strong and easy bleaching pulp, and are tabulated in Tables 6, 7, 8, 9, 10.

DISCUSSION OF TABLES

Table 6—Pulp Yield Per Digester Space

As to the yield, it was found advisable to use the above as the unit as the pulp yield per digester space gives the fairest comparison and offers a basis for discussion. The table covering the pulp yield per digester volume includes data as to moisture in the chips, and the degree of digestion, both of which have a bearing influencing the results. The pulp yield per digester volume is expressed in kg./cu.m and in the corresponding U. S. Standard: lb./ cu. ft.

Table 7—Production Efficiency

The production efficiency is expressed in kg. per cu. meter digester volume per 24 hr. and in lb. per cu. foot digester volume per 24 hr. which unit includes both the pulp yield per digester space and the total cycle.

Table 8—Pulp Yield Per Unit Unbarked Wood

The pulp yield per unit unbarked wood is expressed in lb. screened pulp per cord of unbarked wood, and the table covers also the woodroom losses for the different mills.

Table 9—Steam and Sulphur Consumption

The steam and sulphur consumption are tabulated in the same table, and are expressed in the U. S. Standard. Sulphur in lb. per ton of screened pulp, and steam in lb. per lb. pulp.

The following is an analysis of the factors influencing the different results, as tabulated above, in the basis of the results at the various mills:

A. Pulp Yield Per Digester Space.

1. Moisture in chips (if chips are partially frozen).
2. Size of chips.
3. Whether digester is steamed and refilled, or not.
4. Size of digester.
5. Degree of digestion.
6. Kind of wood cooked.

B. Production Efficiency.

1. Pulp yield per digester space.
2. Length of time required for cooking and intermediate procedures. (Total cycle.)

C. Pulp Yield Per Unit Unbarked Wood.

1. Woodroom losses.
2. Kind of wood cooked.
3. Degree of digestion.

D. Sulphur Consumption.

1. Several local conditions: in efficient reclaiming, leaks, sulphur or pyrite burning, blows at high test, high combined, etc.
2. Proportion of discharged liquor to pulp.
3. Pulp yield per digester space.

E. Steam Consumption.

1. Direct or indirect heating.
2. Maximum temperature of digester.
3. Local conditions: wet, dry or superheated steam, insulation of digesters and pipelines, etc.
4. Proportion of acid to pulp.
5. Moisture in chips.
6. Pulp yield per digester space.

Pulp Yield Per Digester Space

1. Moisture in Chips.

The moisture in the chips, has a certain bearing on the pulp yield per digester space, due to the fact that the higher the moisture content is in the chips, the greater is the degree

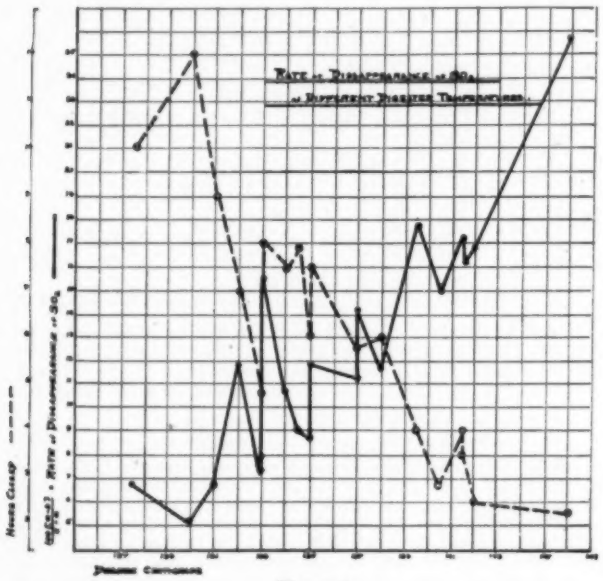

Figure 1

of packing; a larger quantity of wood is charged per digester and consequently a higher pulp yield per cook is obtained. The reverse takes place, if chips are partially frozen, as they then take up more space in the digester and consequently a lower yield is effected. The figures cover tests of cooks made in the same digester from the same wood, all factors being equal but the moisture of the wood. The tests are made at Mill 10.

Moisture in chips	Yield per digester: Strong pulp	Yield per digester: Easy bleaching pulp
%	tons	tons
40	18.8	17.6
20	19.1	16.0

2. Size of Chips.

That the size of chips cooked must have an influence on the pulp yield per digester space is plainly shown from the figures of the weight of chips of different sizes.

Wt. per cu. ft. a. d. Chips (Hemlock)

		lb.
1.	Caught on 1.050″ Screen	8.48
2.	Caught on 0.525″ Screen	9.39
3.	Caught on 0.185″ Screen	10.51
4.	Through 0.185″ Screen	9.72

The smaller the chips, the greater the weight per cu. ft., consequently more wood per digester and higher pulp output per cook. From the point of uniform pulp and low screenings, however, it is a general practice to make the chips of the size of fraction 2.

3. Steaming and Refilling.

By the steaming of the digester previous to the pumping of the acid, the chips pack together and volume space is gained, ranging from 10 to 12 per cent of the total digester volume, which space is refilled with chips. This method is employed in the Mitscherlich process of making sulphite, and is the main reason for the high yield obtained by this method. Tests done at the Mill 4, cooking Mitscherlich sulphite without previous steaming showed the following results, compared with the results obtained from the general practice when steaming and refilling are done.

	Yield per digester U. S. tons	Pulp yield per digester space: kg. cu. m.	Pulp yield per digester space: lb. cu. ft.
Without steaming	13.5	79.0	4.94
With steaming and refilling	14.9	86.5	5.40

It is noticeable that according to these tests, the pulp yield per digester space, when steaming and refilling is omitted, is the same as average yield per digester space for both Ritter-Kellner and Quick Cook mills, when spruce is cooked; especially when the fact is taken into consideration that pulp cooked in this mill has a bleaching ability of 48 per cent bleaching powder, compared with an average of 19.5 per cent for the Ritter-Kellner mills. In the light of this test the Mitscherlich process should not give a higher yield from the wood digested, than any one of the direct cooking methods.

4. Size of Digester.

That the size of digester or rather the height must have an influence on the pulp yield per digester space, is obvious and is fully noticeable, when the results in the two mills are compared. Both mills make easy bleaching pulp of practically the same quality, the wood and methods of cooking being equal in both cases.

Mill	Digester volume cu. m.	Pulp yield per digester space: kg. cu. m.	Pulp yield per digester space: lb. cu. ft.
18	235	74.5	4.65
17	48	68.8	4.28

TABLE 6—PULP YIELD PER DIGESTER SPACE

Mill	Cooking method	Country	Grade	Wood cooked	Digester volume cu. m.	Yield per digester: M. tons	Yield per digester: U.S. tons	Moisture content chips per cent	Pulp yield per dig. space: kg. cu. m.	Pulp yield per dig. space: Lb. cu. ft.	Bleached consumption 35% bleach powder per cent
1	Mitscherlich	Sweden	Strong	Spruce	150	13.5	14.9	....	90.0	5.62	....
2	Mitscherlich	Sweden	Strong	Spruce	150	13.8	15.2	45	92.0	5.74	35
3	Mitscherlich	Sweden	Strong	Spruce	135	12.3	13.5	40	91.1	5.68	....
4	Mitscherlich	Sweden	Strong	Spruce	156	13.5	14.9	40	86.5	5.40	48
5	Mitscherlich	Sweden	Strong	Spruce	130	12.3	13.5	45	94.6	5.90	37
6	Mitscherlich	Sweden	Strong	Spruce	150	13.6	15.0	36	90.7	5.66	36
7	Mitscherlich	Sweden	Strong	Spruce	180	16.0	17.6	....	88.9	5.55	43
8	Mitscherlich	Finland	Strong	Spruce	150	13.5	14.9	....	90.0	5.62	18
6	Mitscherlich	Sweden	Easy Bl.	Spruce	150	12.0	13.2	36	80.0	5.00	15
9	Ritter-Kellner	Sweden	Strong	Spruce	100	7.8	8.6	....	78.0	4.87	16
10	Ritter-Kellner	Finland	Strong	Spruce	213	18.0	19.8	40	84.5	5.27	20
10	Ritter-Kellner	Finland	Strong	Spruce	213	17.4	19.1	20	81.7	5.10	20
11	Ritter-Kellner	Finland	Strong	Spruce	164	12.5	13.8	40	76.2	4.75	18
12	Ritter-Kellner	Finland	Strong	Spruce	250	19.4	21.3	20	77.6	4.84	....
13	Ritter-Kellner	Finland	Strong	Spruce	177	14.0	15.4	35	79.1	4.94	20
14	Ritter-Kellner	Finland	Strong	Spruce	160	12.0	13.2	35	75.0	4.68	....
15	Ritter-Kellner	Sweden	Easy Bl.	Spruce	172.6	12.0	13.2	26	69.5	4.33	8-10
16	Ritter-Kellner	Sweden	Easy Bl.	Spruce	150	10.5	11.6	20	70.0	4.37	6-7
9	Ritter-Kellner	Sweden	Easy Bl.	Spruce	100	7.3	8.0	....	73.0	4.56	8-9
10	Ritter-Kellner	Finland	Easy Bl.	Spruce	213	16.0	17.6	40	75.1	4.69	9-12
10	Ritter-Kellner	Finland	Easy Bl.	Spruce	213	14.5	16.0	20	68.1	4.25	9-12
11	Ritter-Kellner	Finland	Easy Bl.	Spruce	164	12.0	13.2	40	73.1	4.56	12
17	Ritter-Kellner	Finland	Easy Bl.	Spruce	48	3.3	3.6	20	68.8	4.28	12
18	Ritter-Kellner	Finland	Easy Bl.	Spruce	235	17.5	19.3	25	74.5	4.65	14
13	Ritter-Kellner	Finland	Easy Bl.	Spruce	177	13.0	14.3	20	73.3	4.57	10
14	Ritter-Kellner	Finland	Easy Bl.	Spruce	160	11.2	12.3	20	70.0	4.37	10
20	Quick Cook	Canada	Strong	Spruce	120	9.1	10.0	....	75.8	4.74	....
21	Quick Cook	U. S. A.	Strong	Spruce	162	13.3	14.6	....	82.1	5.12	....
27	Quick Cook	U. S. A.	Strong	Spruce & fir	205	12.5	13.8	....	60.9	3.80	....
28	Quick Cook	U. S. A.	Strong	Spruce & fir	145	10.0	11.0	....	68.9	4.30	....
19	Quick Cook	U. S. A.	Strong	Helmock	124	7.5	8.3	37	60.5	3.78	30
25	Quick Cook	U. S. A.	Strong	Hemlock	155	9.1	10.0	....	58.6	3.66	....
22	Quick Cook	U. S. A.	Easy Bl.	Spruce	213	15.5	17.0	35	72.8	4.54	10
21	Quick Cook	U. S. A.	Easy Bl.	Spruce	162	12.5	13.8	....	77.1	4.81	9
23	Quick Cook	Canada	Easy Bl.	Spruce & fir	223	15.4	16.9	40	69.1	4.31	16
35	Quick Cook	Canada	Easy Bl.	Spruce & fir	89	5.6	6.0	....	62.3	3.89	17
22	Quick Cook	U. S. A.	Easy Bl.	Hemlock	213	12.3	13.5	35	57.7	3.60	18

5. Degree of Digestion.

The most deciding effect on the pulp yield per digester volume is governed by the degree of digestion. If we compare for instance Mill 10, cooking down to a bleach consumption of 20 per cent and cooking down to 9-12 per cent other factors being equal, we find that the yield in the first case is considerably higher.

Mill	Bleach consumption %	Pulp yield per digester space kg. cu. m.	Pulp yield per digester space lb. cu. ft.
10	20	81.7	5.10
10	9–12	68.1	4.25

The last and more important factor in our analysis of con-

6. Kind of Wood Cooked.

ditions influencing the pulp yield per digester volume is of course the wood cooked.

We know that spruce holds 58-60 per cent cellulose, fir 53-56 per cent, and hemlock 49-53 per cent, and quite naturally the yield must vary at least in proportion to the cellulose content of the specimens cooked. The influence of the wood is conclusively shown in Mill 22, cooking easy bleaching pulp from hemlock and spruce separately, and in the condensed Table No. 11.

Mill	Wood cooked	Pulp yield per digester space kg. cu. m.	Pulp yield per digester space lb. cu. ft.
22	Spruce	72.8	4.54
22	Hemlock	57.7	3.60

Production Efficiency

1. Pulp Yield Per Digester Space.

That the yield per digester space has a bearing in the production efficiency is obvious and is plainly shown at Mill 10, at equal total cycle.

Mill	Yield per dig. space space lb. cu. ft.	Total cycle hr.	kg/m³/24 hr.
10	4.69	23½	77
10	4.25	23½	70

TABLE 8—PULP YIELD PER UNIT UNBARKED WOOD

Mill	Cooking method	Country	Grade	Wood	Wood per ton a. d. Pulp, p. m.	Pulp a. d. per cord of wood, lb.	Wood room losses, %
1.	Mitsch....	Sweden	Strong	Spruce	7.3	1,093	15
2.	Mitsch....	Sweden	Strong	Spruce	7.3	1,093	13
4.	Mitsch....	Sweden	Strong	Spruce	7.3	1,093	13
5.	Mitsch....	Sweden	Strong	Spruce	7.4	1,077	15
6.	Mitsch....	Sweden	Strong	Spruce	7.6	1,049	16—21
8.	Mitsch....	Finland	Strong	Spruce	7.5	1,063	15
6.	Mitsch....	Sweden	Easy Bl.	Spruce	8.2	972	16—21
9.	Ritt.-K....	Sweden	Strong	Spruce	7.8	1,023	18
10.	Ritt.-K....	Finland	Strong	Spruce	7.5	1,064	18
11.	Ritt.-K....	Finland	Strong	Spruce	7.7	1,036	.....
13.	Ritt.-K....	Finland	Strong	Spruce	7.8	1,023	17—20
14.	Ritt.-K....	Finland	Strong	Spruce	8.0	997	16
15.	Ritt.-K....	Sweden	Easy Bl.	Spruce	8.4	949	15
16.	Ritt.-K....	Sweden	Easy Bl.	Spruce	8.3	961	13
9.	Ritt.-K....	Sweden	Easy Bl.	Spruce	8.5	939	18
10.	Ritt.-K....	Finland	Easy Bl.	Spruce	8.0	997	18
11.	Ritt.-K....	Finland	Easy Bl.	Spruce	8.0	997	.....
17.	Ritt.-K....	Finland	Easy Bl.	Spruce	8.5	939	.....
18.	Ritt.-K....	Finland	Easy Bl.	Spruce	8.1	985	15
13.	Ritt.-K....	Finland	Easy Bl.	Spruce	8.3	961	17—20
19.	Quick Cook.	U. S. A.	Strong	Hemlock	.....	971	10
25.	Quick Cook.	U. S. A.	Strong	Hemlock	.....	900	11
31.	Quick Cook.	U. S. A.	Strong	Hemlock	.....	1,000	.....
20.	Quick Cook.	Canada	Strong	Spruce	.....	1,250	.....
21.	Quick Cook.	U. S. A.	Strong	Spruce	.....	1,112	11
33.	Quick Cook.	U. S. A.	Strong	Spruce	.....	1,100	.....
24.	Quick Cook.	U. S. A.	Strong	Spruce & fir	.....	1,110	.....
27.	Quick Cook.	U. S. A.	Strong	Spruce & fir	.....	1,100	.....
30.	Quick Cook.	U. S. A.	Strong	Spruce & fir	.....	1,000	.....
32.	Quick Cook.	U. S. A.	Strong	Spruce & fir	.....	1,100	.....
22.	Quick Cook.	U. S. A.	Easy Bl.	Hemlock	.....	900	.....
26.	Quick Cook.	U. S. A.	Easy Bl.	Hemlock	.....	900	.....
22.	Quick Cook.	U. S. A.	Easy Bl.	Spruce	.....	1,060	.....
21.	Quick Cook.	U. S. A.	Easy Bl.	Spruce	.....	1,000	.....
23.	Quick Cook.	Canada	Easy Bl.	Spruce & fir	.....	978	11
29.	Quick Cook.	Canada	Easy Bl.	Spruce & fir	.....	1,100	.....

2. Total Cycle.

The cooking time and time required for intermediate procedures, has the largest bearing on the production efficiency, which is conclusively brought out in the condensed tables. Comparison of Mill 10, Mill 17, and Mill 22, with about equal pulp yield per digester space, but different total cycles show this.

Mill	Total cycle, hr.	kg./m³/24 hr.
10	23½	70
17	13½	124
22	11½	154

The two greatest influencing factors in the pulp yield per unit unbarked wood, is quite obviously the wood room losses

TABLE 9—SULPHUR AND STEAM CONSUMPTION

Mill	Cooking method	Country	Grade	Wood cooked	Sulphur per ton a. d. pulp, lb.	Steam per lb. a. d. pulp, lb.
2.	Mitsch.....	Sweden	Strong	Spruce	250	2.2
3.	Mitsch.....	Sweden	Strong	Spruce	190	2.3
4.	Mitsch.....	Sweden	Strong	Spruce	280	...
5.	Mitsch.....	Sweden	Strong	Spruce	160	...
6.	Mitsch.....	Sweden	Strong	Spruce	180	2.5
8.	Mitsch.....	Finland	Strong	Spruce	180	2.1
6.	Mitsch.....	Sweden	Easy	Spruce	200	2.7
9.	Ritt.-K.....	Sweden	Strong	Spruce	180	3.2
10.	Ritt.-K.....	Finland	Strong	Spruce	210	2.9
10.	Ritt.-K.....	Finland	Strong	Spruce	220	2.8
11.	Ritt.-K.....	Finland	Strong	Spruce	200	3.1
13.	Ritt.-K.....	Finland	Strong	Spruce	185	...
14.	Ritt.-K.....	Finland	Strong	Spruce	190	3.0
15.	Ritt.-K.....	Sweden	Easy	Spruce	210	2.0
16.	Ritt.-K.....	Sweden	Easy	Spruce	220	1.6
9.	Ritt.-K.....	Sweden	Easy	Spruce	200	3.4
10.	Ritt.-K.....	Finland	Easy	Spruce	260	3.3
10.	Ritt.-K.....	Finland	Easy	Spruce	270	3.0
11.	Ritt.-K.....	Finland	Easy	Spruce	200	3.3
17.	Ritt.-K.....	Finland	Easy	Spruce	240	3.0
18.	Ritt.-K.....	Finland	Easy	Spruce	210	2.8
14.	Ritt.-K.....	Finland	Easy	Spruce	190	3.2
19.	Quick Cook..	U. S. A.	Strong	Hemlock	290	3.8
25.	Quick Cook..	U. S. A.	Strong	Hemlock	...	3.5
31.	Quick Cook..	U. S. A.	Strong	Hemlock	280	...
20.	Quick Cook..	Canada	Strong	Spruce	...	...
21.	Quick Cook..	U. S. A.	Strong	Spruce	220	2.1
33.	Quick Cook..	U. S. A.	Strong	Spruce	...	3.1
24.	Quick Cook..	U. S. A.	Strong	Spruce & fir	...	3.6
27.	Quick Cook..	U. S. A.	Strong	Spruce & fir	240	3.8
30.	Quick Cook..	U. S. A.	Strong	Spruce & fir	...	3.3
22.	Quick Cook..	U. S. A.	Easy Bl.	Hemlock	300	3.9
22.	Quick Cook..	U. S. A.	Easy Bl.	Spruce	240	3.1
21.	Quick Cook..	U. S. A.	Easy Bl.	Spruce	240	2.4
23.	Quick Cook..	Canada	Easy Bl.	Spruce & fir	270	2.6
29.	Quick Cook..	Canada	Easy Bl.	Spruce & fir	260	3.5

TABLE 10—COMPOSITION OF THE COOKING ACID

Country	Mill No.	Total SO_2 %	Free SO_2 %	Comb. SO_2 %	Acid System
Sweden.....	1	4.07	3.00	1.07	Mitsch. System
	2	4.16	3.13	1.03	Mitsch. System
	3	4.13	3.10	1.03	Shamber System
	5	4.35	3.26	1.09	Shamber System
	6	3.96	3.02	0.94	Shamber System
	7	4.30	3.10	1.20	Mitsch. Tower
	15	4.00	2.97	1.03	Mitsch. Tower
	16	4.23	2.93	1.30	Jenssen Tower
Finland.....	11	4.22	3.02	1.20	Mitsch. Tower
	14	4.50	3.50	1.00	Mitsch. Tower
	12	4.75	3.55	1.20	Concrete Tower
	10	4.50	3.50	1.00	Concrete Tower
	17	4.00	2.90	1.10	Mitsch. Tower
	18	4.67	3.49	1.18	Jenssen Tower
	13	4.22	3.20	1.02	Jenssen Tower
America.....	23	5.00	4.00	1.00	Jenssen Tower
	24	5.05	4.01	1.04	Barker System
	25	5.94	4.86	1.08	Jenssen Tower
	26	4.80	3.60	1.20	Jenssen Tower
	27	4.00	2.90	1.16	Jenssen Tower
	28	5.00	4.00	1.00	Jenssen Tower
	29	4.80	3.70	1.10	Barker System
	30	5.88	4.58	1.30	Jenssen Tower
	31	4.20	2.80	1.40	Milk of Lime
	32	5.10	3.90	1.02	Jenssen Tower
	33	5.00	4.00	1.00	Jenssen Tower
	19	4.43	3.20	1.23	Jenssen Tower
	34	4.05	2.72	1.30	Stebbins System

and the kind of wood cooked, which are easily noticeable in the condensed tables, and I refer to a comparison of Ritter-Kellner mills and Quick Cook mills cooking strong pulp from spruce, where practically the same pulp yield per digester space is obtained, the former mill rossing their wood in knife barking machines, and having an average wood room loss of 17.5 per cent, while Quick Cook mills on this continent, using barking drums in general, seldom run with a wood room loss exceeding 11 per cent.

	Yield per digester space per lb. cu. ft.	Wood room losses, %	Yield screened pulp per cord unbarked wood, lb.
Ritter-Kellner.....	79.0	17.5	1,030
Quick cook.....	79.0	11.0	1,154

In this connection, I call attention once more to the above statement, that the Mitscherlich progress does not give a higher yield from the wood than the direct methods, and I refer to the pulp yield per unit unbarked wood, condensed Table 13. In Sweden and Finland the wood used in the manufacturing of sulphite is identical, both as to properties, and the size of the logs, and the average of the results obtained in the Swedish Mitscherlich mills, and the Finnish Ritter-Kellner mills, shown in the condensed tables, prove this statement, if an allowance is made for the lower degree of digestion in the Mitscherlich process, and for the slightly lower wood room losses.

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	Wood cooked	Wood room losses %	Bleach-ability %	Yield strong pulp per cord lb.
Mitscherlich	Spruce	14.9	40	1,081
Ritter-Kellner	Spruce	17.5	19.5	1,030

The influence of the kind of wood cooked is obvious, and does not require a separate discussion.

Sulphur Consumption

1. Sulphur or Pyrites Burning.

In the roasting of pyrites, there is always a loss of sulphur in the cinders, and through the formation of SO_3. The roasting can, in well regulated furnaces, be brought down to 6 per cent sulphur remaining in the cinders, which, however, means a loss of 12 to 17 per cent of the total sulphur in the pyrites, depending on the sulphur content of the ore. This is best noticeable in the figure for the average sulphur consumption in Mitscherlich mills, burning sulphur compared with the ones burning pyrites.

	Average sulphur consumption sulphur per ton pulp, lb.
Pyrites	265
Sulphur	178

2. Proportion of Discharged Liquor to Pulp.

The largest loss of sulphur in the sulphite process is in form of free, combined, and loosely combined SO_2 remaining in the liquor at blowing or draining and in form of calcium sulphate, and the test of the liquor and the amount are the determining factors of this loss. A high blow test always means a loss of sulphur and the lower sulphur consumption in the Mitscherlich process, compared with direct cooking is fully realized under the consideration of the attached figures.

	Indirect cooking	Direct cooking
Digester, volume	5,295 cu. ft.	5,295 cu. ft.
Pulp yield per digester	14.8 tons	13.4 tons
Acid per digester	3,360 cu. ft.	4,240 cu. ft.
Condensate from cooking steam	None	1,270 cu. ft.
Liquor relief	None	889 cu. ft.
Liquor discharged at end of cook	3,360 cu. ft.	4,630 cu. ft.
Test of liquor at discharge	%	%
1_2—Test SO_2	0.01	0.10
Loosely combined SO_2	0.20	0.20
Total SO_2	0.30	0.30
In liquor at discharge, SO_2	630 lbs.	870 lbs.
Sulphur lost in liquor per ton pulp	21.3 lbs.	32.5 lbs.

3. Pulp Yield per Digester Space.

The influence of the pulp yield per digester space on the

TABLE 7—PRODUCTION EFFICIENCY KG. CU. METER DIGESTER, SPACE 24 HRS.

Mill	Cooking method	Dig. Vol. cu. m.	Grade	Wood cooked hr.	Filling of chips hr.	hr.	Steaming hr.	Acid pumping hr.	Actual cooking lime hr.
1	Mitscherlich	150	Strong	Spruce	.30	....	.45	.30	16.00
2	Mitscherlich	150	Strong	Spruce	....	.45*	....	1.15	15.00
3	Mitscherlich	135	Strong	Spruce	....	1.15*	....	.30	17.00
4	Mitscherlich	156	Strong	Spruce	1.00	....	.45	.45	16.00
5	Mitscherlich	130	Strong	Spruce	....	1.00*	....	.45	17.15
6	Mitscherlich	150	Strong	Spruce	.30	....	1.30	.45	17.00
8	Mitscherlich	150	Strong	Spruce	....	....	....	....	18.00
6	Mitscherlich	150	Easy Bl.	Spruce	.30	....	1.30	.45	20.00
9	Ritter-Kellner	100	Strong	Spruce	....	1.00*	....	.30	14.00
10	Ritter-Kellner	213	Strong	Spruce	.40	....	....	.45	14.30
10	Ritter-Kellner	213	Strong	Same as above.	Different yield on account of dry chips.			See Table 6.	
11	Ritter-Kellner	164	Strong	Spruce	.45	....	....	.45	12.00
12	Ritter-Kellner	250	Strong	Spruce	....	....	....	....	....
13	Ritter-Kellner	177	Strong	Spruce	.30	....	....	.40	14.00
14	Ritter-Kellner	160	Strong	Spruce	.30	....	....	.30	12.00
15	Ritter-Kellner	172.6	Easy Bl.	Spruce	....	....	....	.30	18.30
16	Ritter-Kellner	150	Easy Bl.	Spruce	.30	....	....	.45	16.00
9	Ritter-Kellner	100	Easy Bl.	Spruce	1.00	....	....	.30	19.00
10	Ritter-Kellner	213	Easy Bl.	Spruce	.40	....	....	.45	19.00
10	Ritter-Kellner	213	Easy Bl.	Spruce	Same as above.	Different yield on account of dry chips. See Table 6.			
11	Ritter-Kellner	164	Easy Bl.	Spruce	.45	....	....	.45	17.00
17	Ritter-Kellner	48	Easy Bl.	Spruce	1.00	....	....	1.15	11.00
18	Ritter-Kellner	235	Easy Bl.	Spruce	.45	....	....	.55	14.00
13	Ritter-Kellner	177	Easy Bl.	Spruce	.30	....	....	.40	16.00
14	Ritter-Kellner	160	Easy Bl.	Spruce	.30	....	....	.30	15.00
20	Quick Cook	120	Strong	Spruce	....	....	....	....	.....
21	Quick Cook	162	Strong	Spruce	....	....	....	....	.....
27	Quick Cook	205	Strong	Spruce & fir	....	....	....	....	.....
28	Quick Cook	145	Strong	Spruce & fir	....	....	....	....	.....
19	Quick Cook	124	Strong	Hemlock	....	....	....	....	.....
25	Quick Cook	155	Strong	Hemlock	.25	....	....	.15	8.00
22	Quick Cook	213	Easy Bl.	Spruce	.30	....	....	.45	10.00
21	Quick Cook	162	Easy Bl.	Spruce	....	....	....	....	.....
23	Quick Cook	223	Easy Bl.	Spruce & fir	....	....	....	....	.....
35	Quick Cook	80	Easy Bl.	Spruce & fir	....	....	....	....	.....
22	Quick Cook	213	Easy Bl.	Hemlock	.30	....	....	.45	10.00

Mill	Gassing hr.	hr.	Liquor draining hr.	Blowing hr.	Washing hr.	hr.	Dumping hr.	Repair hr.	Total cycle hr.	Yield per ck. m. t.	Kg./cu.m. per 24 hr.	Country
1	....	1.30	....	....	....	1.00	....	.30	21.05	13.5	103	Sweden
2	2.00	....	.45	....	....	.30	....	.30	20.45	13.8	107	Sweden
3	....	2.00	....	....	....	....	1.30	....	22.15	12.3	98	Sweden
4	....	2.00	....	....	....	.30	....	.45	21.45	13.5	95	Sweden
5	1.30	....	2.30	....	....	1.45	....	.30	25.15	12.3	90	Sweden
6	....	2.00	....	....	....	1.30	....	.30	23.45	13.6	92	Sweden
8	....	....	....	....	....	....	....	....	24.00	13.5	90	Finland
6	....	2.00	....	....	....	1.30	....	.30	26.45	12.0	72	Sweden
9	....	1.30	....	.15	.30	....	....	....	17.45	7.8	105	Sweden
10	....	2.20	....	....	....	.45	....	....	19.00	18.0	107	Finland
10	....	....	....	....	....	....	....	....	19.00	17.4	104	Finland
11	....	2.00	....	....	.15	....	....	....	16.00	12.5	114	Finland
12	....	....	....	....	....	....	....	....	....	19.4	....	Finland
13	2.30	....	1.30	....	....	.30	....	....	19.40	14.0	97	Finland
14	....	2.00	....	.15	.15	....	....	....	15.30	12.0	116	Finland
15	....	2.00	....	....	....	1.00	....	....	22.00	12.0	78	Sweden
16	....	2.00	....	....	....	1.15	....	....	20.30	10.5	82	Sweden
9	....	1.30	....	.15	.30	....	....	....	22.45	7.3	77	Sweden
10	....	2.20	....	....	....	.45	....	....	23.30	16.0	77	Finland
10	....	....	....	....	....	....	....	....	23.30	14.5	70	Finland
11	....	2.00	....	.15	.15	....	....	....	21.00	12.0	83	Finland
17	....	....	....	.15	....	....	....	....	13.30	3.3	124	Finland
18	....	3.00	1.00	....	....	1.00	....	....	20.40	17.5	86	Finland
13	....	2.00	....	....	....	1.00	....	....	20.10	13.0	84	Finland
14	....	2.00	....	.15	.15	....	....	....	18.30	11.2	91	Finland
20	....	....	....	....	....	....	....	....	10.30	9.1	174	Canada
21	....	....	....	....	....	....	....	....	10.00	13.3	197	U. S. A.
27	....	....	....	....	....	....	....	....	12.00	12.5	122	U. S. A.
28	....	....	....	....	....	....	....	....	8.45	10.0	189	U. S. A.
19	....	....	....	.07	....	....	....	....	8.47	7.5	165	U. S. A.
25	....	....	....	....	....	....	....	....	8.00	9.1	176	U. S. A.
22	....	....	....	.15	....	....	....	....	11.30	15.5	154	U. S. A.
21	....	....	....	....	....	....	....	....	12.00	12.5	154	U. S. A.
23	....	....	....	....	....	....	....	....	14.00	15.4	119	Canada
35	....	....	....	....	....	....	....	....	8.00	5.6	187	Canada
22	....	....	....	.15	....	....	....	....	11.30	12.3	121	U. S. A.

*Steaming and filling of chips at the same time.

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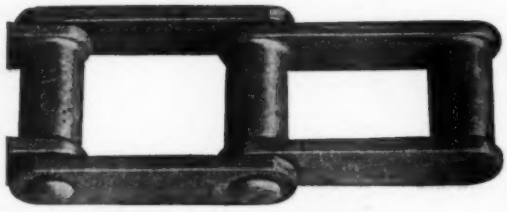

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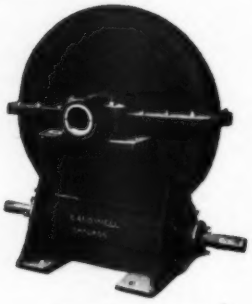

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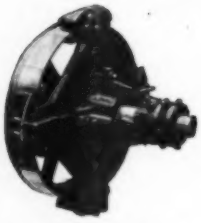

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sulphur consumption is obvious from the above and is also shown in the instances given.

Mill	Pulp yield per digester space lb. per cu. ft.	Sulphur per ton pulp. lb.
5	5.90	160
10	5.10	220
22	3.60	300

Steam Consumption

An analysis of the conditions affecting the steam consumption is rendered difficult due to the large variations in the different mills, on account of favorable or unfavorable conditions. The differences in the steam consumption in the direct and the indirect heating, is, however, noticeable in the condensed Table 15, comparing Mitscherlich with Ritter-Kellner mills, having the same maximum temperatures.

	Steam per lb. screened strong pulp
Direct cooking	3.1
Indirect cooking	2.2

Even after making an allowance of 10-12 per cent for higher pulp yield per digester space, in the Mitscherlich process, the direct cooking method has a higher steam consumption than the indirect.

4. Proportion of Acid to Pulp.

The amount of acid to be heated has of course, an important effect in the steam consumption. Take for instance, Mill 16 having rotary, horizontal digesters, and Mill 10; the former using 225 cu. ft. acid per ton pulp, the latter 380 cu. ft. acid per ton pulp, both mills cooking easy bleaching pulp directly, under practically the same conditions.

Mill	Pulp yield per digester space lb. per cu. ft.	Acid per ton pulp cu. ft.	Steam consumption lb. steam per lb. pulp
16	4.37	225	1.6
10	4.25	380	3.0

Conclusions

1. The same yield of strong pulp per digester space is obtained in the Quick Cook mills in this continent when spruce is cooked, as in the Ritter-Kellner mills in Sweden and Finland.

2. A lower yield of easy bleaching pulp is obtained in Finnish and Swedish Ritter-Kellner mills cooking spruce, than in Quick Cook mills in this continent cooking the same kind of wood.

3. A lower yield of both strong and easy bleaching pulp is obtained from a mixture of spruce and fir, than from spruce alone.

4. 23.5 per cent lower yield of strong pulp is obtained from hemlock than from spruce.

5. 23.0 per cent lower yield of easy bleaching pulp is obtained from hemlock than from spruce.

6. In the light of tests done at Mill 4 and of the data in the condensed Table 13, the Mitscherlich process does not give higher yield of pulp from the wood than the direct cooking methods.

7. In case of strong pulp the production efficiency is:
   (a) 14 per cent higher for Ritter-Kellner mills than for Mitscherlich mills.
   (b) 78 per cent higher for Quick Cook mills cooking hemlock than for Mitscherlich mills cooking spruce.
   (c) 100 per cent higher for Quick Cook mills cooking spruce than for Mitscherlich mills.

8. In case of easy bleaching pulp the production efficiency is:
   (a) 16 per cent higher for Ritter-Kellner mills cooking spruce than for Mitscherlich mills.
   (b) 68 per cent higher for Quick Cook mills cooking hemlock than for Mitscherlich mills cooking spruce.
   (c) 114 per cent higher for Quick Cook mills cooking spruce than for Mitscherlich mills.

9. In other words where a Quick Cook mill cooking spruce is using 5 digesters to turn out a certain production a Quick Cook mill cooking hemlock must use 6, a Ritter-Kellner mill 9, and a Mitscherlich mill 10, digesters, in order to turn out the same production.

10. The yield of strong pulp per cord unbarked spruce is higher in Quick Cook mills on this continent than in the Mitscherlich mills, and Ritter-Kellner mills, in Sweden and Finland.

11. When cooking a mixture of spruce and fir, less yield per cord is obtained than when cooking spruce alone. When cooking hemlock 15 per cent less yield per cord is obtained than when cooking spruce.

12. In cooking easy bleaching pulp 7 per cent less yield is obtained than when cooking strong pulp.

13. When burning pyrites, the sulphur consumption is higher than in case of sulphur burning.

14. 12 to 18 lb. more sulphur per ton pulp is consumed in the Ritter-Kellner process than in the Mitscherlich process.

15. When cooking spruce 21 to 30 lb. more sulphur per ton pulp is required in the Quick Cook process than in the Ritter-Kellner process.

16. When cooking a mixture of spruce and fir 20 to 25 lb. more sulphur per ton is required in the Quick Cook process than when cooking spruce only.

17. When cooking hemlock 35 to 45 lb. more sulphur is required in the Quick Cook process than when a mixture of spruce and fir is cooked.

18. 11 per cent higher sulphur consumption is effected in cooking easy bleaching pulp as compared with strong pulp.

19. The steam consumption in the direct cooking process is higher than in the indirect process.

20. The steam consumption increases with the decrease of the yield from the species of wood cooked.

Average Condensed Tables

TABLE 11—PULP YIELD PER DIGESTER SPACE

Cooking method	Country	Wood Cooked	Pulp yield per digester space: Strong pulp kg.cu.m.	Strong pulp cu.ft.	Easy bl. pulp kg.cu.m.	Easy bl. pulp cu.ft.
Mitscherlich	Sweden	Spruce	90.5	85.65	80.0	4.99
Mitscherlich	Finland	Spruce	90.0	95.62	....	....
Ritter-Kellner	Sweden	Spruce	78.0	4.87	70.8	4.42
Ritter-Kellner	Finland	Spruce	79.0	4.93	71.8	4.48
Quick Cook	U.S.A. & Can.	Spruce	78.9	4.92	75.0	4.68
Quick Cook	U.S.A. & Can.	Spr.& fir	64.9	4.05	65.7	4.10
Quick Cook	U.S.A. & Can.	Hemlock	59.6	3.72	57.7	3.60

TABLE 12—PRODUCTION EFFICIENCY

Cooking method	Country	Wood cooked	Production efficiency: Strong pulp kg.cu.m. 24 hr.	Strong pulp lb.cu.ft. 24 hr.	Easy bl. pulp kg.cu.m. 24 hr.	Easy bl. pulp lb.cu.ft. 24 hr.
Mitscherlich	Sweden	Srpuce	97	6.05	72	4.49
Mitscherlich	Finland	Spruce	90	5.62	....	....
Ritter-Kellner	Sweden	Spruce	105	6.55	79	4.93
Ritter-Kellner	Finland	Spruce	108	6.74	88	5.49
Quick Cook	U.S.A.& Can.	Spruce	186	11.61	154	9.61
Quick Cook	U.S.A. & Can.	Spr.& fir	156	9.73	153	9.55
Quick Cook	U.S.A. & Can.	Hemlock	171	10.67	121	7.55

TABLE 13—PULP YIELD UNIT UNBARKED WOOD

Cooking method	Country	Wood cooked	Pulp per cord wood: Strong pulp lb.	Easy bl. pulp lb.
Mitscherlich	Sweden	Spruce	1,081	972
Mitscherlich	Finland	Spruce	1,063	....
Ritter-Kellner	Sweden	Spruce	1,023	950
Ritter-Kellner	Finland	Spruce	1,030	976
Quick Cook	U.S.A. & Can.	Spruce	1,154	1,030
Quick Cook	U.S.A. & Can.	Spr.& fir	1,078	1,039
Quick Cook	U.S.A. & Can.	Hemlock	957	900

TABLE 14—SULPHUR CONSUMPTION

Cooking method	Country	Wood cooked	Sulphur per ton pulp: Strong pulp lb.	Easy bl. pulp lb.
Mitscherlich	Sweden	Spruce	212	200
Mitscherlich	Finland	Spruce	180	....
Ritter-Kellner	Sweden	Spruce	180	210
Ritter-Kellner	Finland	Spruce	201	228
Quick Cook	U.S.A. & Can.	Spruce	220	240
Quick Cook	U.S.A. & Can.	Spr.& fir	240	265
Quick Cook	U.S.A. & Can.	Hemlock	285	300

TABLE 15—STEAM CONSUMPTION

Cooking method	Country	Wood cooked	Steam per lb. pulp: Strong pulp lb.	Easy bl. pulp lb.
Mitscherlich	Sweden	Spruce	2.3	2.7
Mitscherlich	Finland	Spruce	2.1	....
Ritter-Kellner	Sweden	Spruce	3.2	2.3
Ritter-Kellner	Finland	Spruce	3.0	3.1
Quick Cook	U.S.A. & Can.	Spruce	2.6	2.8
Quick Cook	U.S.A. & Can.	Spr.& fir	3.6	3.2
Quick Cook	U.S.A. & Can.	Hemlock	3.7	3.9

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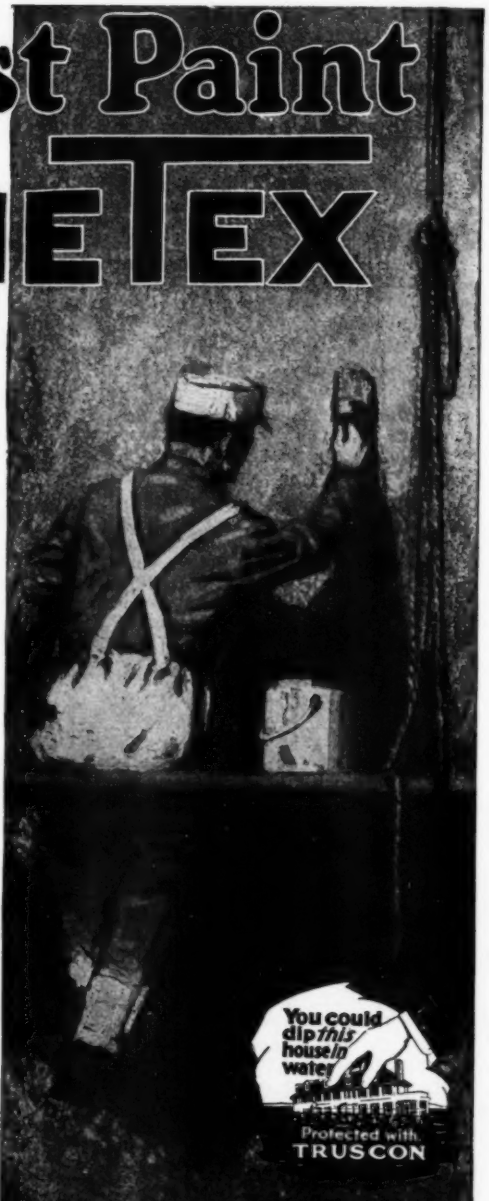

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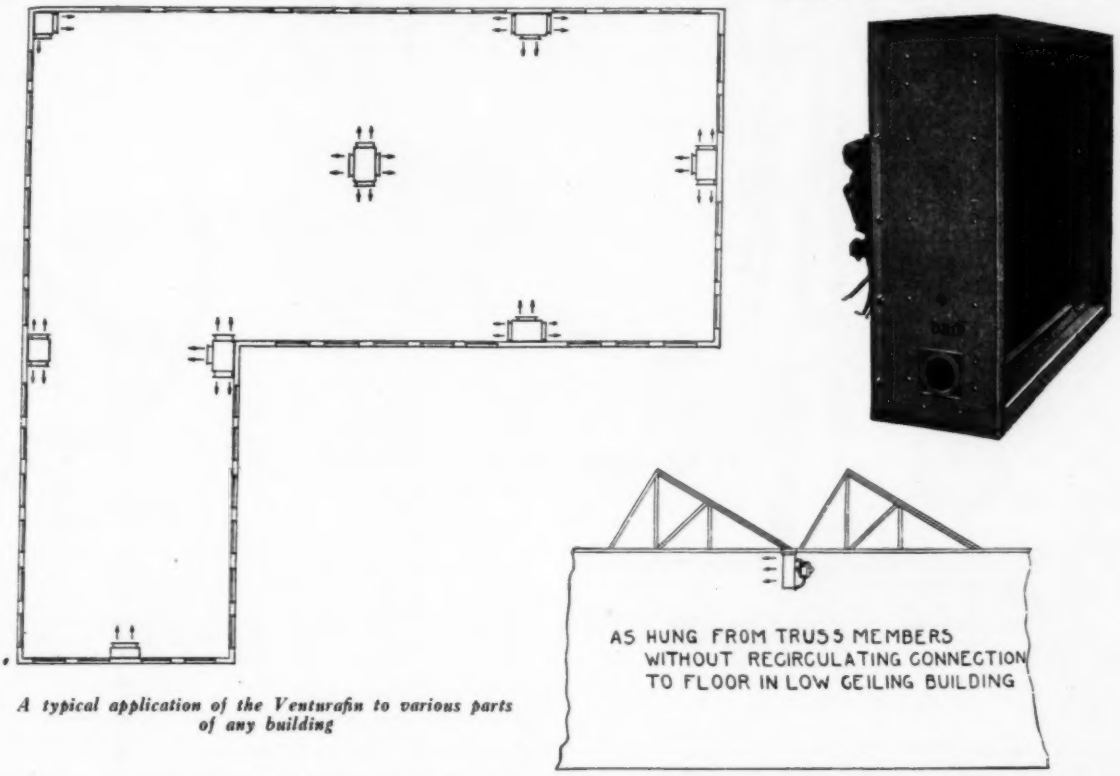
A Simple Heating System

The Venturafin, a new, quickly installed and highly efficient apparatus for the heating of industrial buildings, warehouses, etc., has been designed by the American Blower Company of Detroit, Mich. This is made possible by the patented design of the heating surface. Each square foot of heating surface is capable of radiating—and does radiate—five times the heat that can be given off by a cast iron heating surface of the same inside dimensions. This, together with its light weight, makes it applicable to installations where ordinary heating units would be cumbersome, or altogether impractical. Details of its design, construction and installation are given below.



A typical application of the Venturafin to various parts of any building

The steam coils used in the heater are made from copper and brass, both offering far less resistance to the transmission of heat than iron. This fact alone would give it much

higher efficiency, but coupled with this is a method of construction that actually gives it the ability to transmit five or more times the heat that would be given off by an equal length of ordinary steam coil of the same diameter.

The tubes are made up of straight, seamless copper and brass tubing, about which is helically wound a copper ribbon in such a way that it forms a continuous "fin." It is bent in such a way that a large surface of the fin is in contact with the outer surface of the tube, and this union is later treated so that fin and tube become metallically integral. The integral construction insures easy transmission of heat from tube to fin and from there to the air passing through the fins. By means of this construction the heat transmitting surface is made nearly five times greater than that of the tube alone.

The method of assembly is simple and strong. The tubes are arranged in rows, usually three deep and staggered. The ends of the tubes are pressed into a thin flexible copper plate, the holes in which are slightly smaller than the tubes. This gives a flanged connection that is absolutely tight. The flanges are later given a solder bath, rendering the connection doubly secure. The flexibility of the plate takes care of expansion and contraction.

These heaters are built to withstand a pressure of 50 pounds steam or liquid, and any vacuum. It is built throughout of non-corrosive materials, insuring long service regardless of shop conditions. Each section includes a standard motor driven fan as an integral part of its construction.

The usual method of installation is to place the fan at the top of a steel housing that is so designed that cold or cool air is taken in from near the floor and discharged, thoroughly heated, at a height of about seven feet. This insures constant and complete circulation of all the air in the room. The plan illustrated herewith shows a typical application of these heaters to various parts of a factory or any similar building. They are well adapted for use in irregularly shaped rooms or for localized heating near doors frequently opened or where only a part of a large room is to be heated. Each point where air discharge is shown indicates a separate unit, each having a capacity of approximately 3,000 cubic feet.

All four assemblies of the built-in design are indicated—one, two, three and four unit. An examination will make it plain how these are applicable to every necessary position of the heater. Regardless of whether it is along the wall, in the corner, at an end of the room or in the center, the discharge can be directed in the proper direction. An interesting feature of this plan is the certainty with which every part of the room is reached by the warm air. There is no possibility of cold corners, for every square foot receives a nearly direct current.

The small drawing shows an installation common when floor space is at a premium, or where for any other reason an overhead installation is advisable. In this case the steel housing is not used. There is no loss of heating efficiency here, but the circulation is not as complete as when the housing acts as a conduit to bring cool air from the floor to the heater.

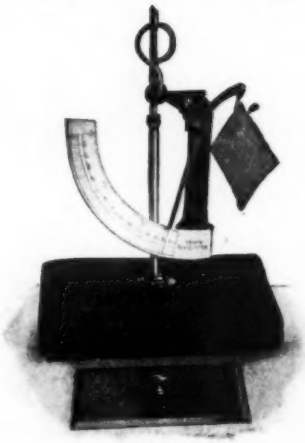
Poller Paper Instruments Insure Accuracy

Paper Tester No. 400

Indicates accurately tensile strength in pounds and percentage and stretch in inches and percentage—all in one operation. Temperature makes no difference. It is the "Supreme Court" of all testing machines. No springs to get out of order. No glycerine or rubber discs to replace. All numerals are in English units and not in Continental Metric system.

Automatic Micrometer

Measures thickness of board and paper accurately. Best instrument on the market for this purpose.



Pocket Scale

For coarse or fine papers. By weighing a piece 2½x3¼ the standard ream weight is accurately shown. Very accurate and reliable. Weighs less than one pound and can be carried without inconvenience.

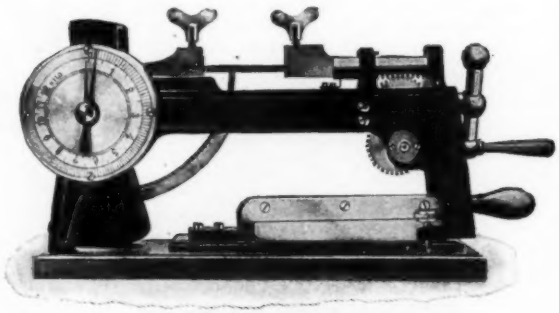
Paper Scale

Indicates ream weight 24x36—480 or 500.

These scales are furnished for weighing a full size sheet, 24x36, or a small piece. Both will indicate ream weight by direct reading. No springs.

Pocket Micrometer

Handy pocket gauge for paper or board. Very accurate.



Paper Tester No. 399

Indicates breaking or tensile strength of paper. Operated by means of gears and screws. No springs to weaken and influence results. This machine is portable, weighing less than five pounds.

Sole Agents for the United States and Canada for Poller Instruments

THE UNION SELLING COMPANY

PAPER AND TWINE

210 Walnut Street, Cincinnati, Ohio

Prospects for Big Superintendents' Meeting at Dayton

WHEN the American Pulp and Paper Mill Superintendants Association meets at Dayton, Ohio, Thursday, Friday and Saturday, May 22, 23, and 24, five hundred delegates from among paper mill men of the United States and Canada are expected to be in attendance.

Friday, May 23, will be Middletown day, according to the present plan, with the delegates taking lunch at the Hotel Manchester and touring local paper mills. H. W. Server, of West Carrollton, is chairman of the convention committee. B. M. Bishop, Tom Harvey, and H. D. Martindale are members from Middletown.

The Miami Hotel in Dayton will be headquarters for the convention. Entertainment especially planned for the wives of the delegates will occur on Thursday evening and a trip through the National Cash Register plant at Dayton is scheduled.

Among the mills to be toured in Middletown is the new Frank Smith paper mill, a mill constructed without a single smoke stack and without a steam engine of any kind connected with it. This new mill will be a unit in the Sorg-Oglesby group and will be in operation the latter part of the summer, it is thought.

Every piece of machinery, including the 104-inch Fourdrinier machine built by the B. F. Horne Company, Lawrence, Mass., will be operated by electrical current installed by Chief Electrician C. S. Newcomb of the Sorg-Oglesby interests.

In the mill there are hard-wood vats for storage of stock which can be pumped direct to the vat at the wet end of the paper machine. The beaters are already in position, so arranged with the famous Lennix drive arrangement on the belting on the floor beneath that they may be thrown in or out of commission at will. The motors which drive the paper machines are located in the basement. A shafting the length of the machine is in place on ball bearings, the whole system of shafting weighing many tons, with several belt wheels moving so easily that one man can set them in motion with slight exertion.

The motors, of Crocker-Wheeler manufacture, are of the synchronous type, of a heavy construction and are the newest thing in variable speed motors. Compensators are to be located in the electrical circuit giving the mill what is termed a very low power factor.

From the basement of the new mill a tunnel approximately 100 feet long leads to the Oglesby mill, carrying electrical conduits along one wall and steam pipes along the other from the Oglesby mill. The steam from the Oglesby mill will be required for drying the paper manufactured in the new concern.

The Smith mill has been designed to accommodate double the amount of machinery that is now being installed. The foundations are in for the second machine and for beaters and stock storage vats.

A bleach house is being constructed between the Smith mill and the Oglesby mill by the F. K. Vaughn company. The excavation has been completed and the foundations and concrete piers are soon to be erected. The bleach house will manufacture the bleach for all Sorg-Oglesby mills.

The Frank Smith mill and the new bleach house occupy ground that has been reclaimed within the last seven years. Formerly the whole area was in the high water zone. About seven years ago a policy of filling in this land was inaugurated and in some places the ground has been filled to a depth from twelve to fifteen feet. As an added precaution against high water a levee has been constructed encircling the entire area. The Sorg interests now control half a mile of land along the river, and if the present policy of expansion continues will in time be covered with paper manufacturing plants.

The two other units in the Sorg-Oglesby plant will likewise prove of interest to the visitors. The W. B. Oglesby plant, with an executive force, consisting of J. A. Aull, president; L. C. Anderson, vice-president; A. F. Smith, vice-president; M. T. Hartley, secretary; H. C. Johnson, treasurer; and C. E. Aull, assistant secretary and treasurer, was incorporated in 1852. Paper and paper board manufactured by this company are used in three-fourths of all the playing cards manufactured in the world, and as covers for Shadowland, Theatre, Motion Picture and Beauty magazines.

In a recent exhibition of industrial products, it was found that products of the P. A. Sorg Company are used in piano rolls, gasket fittings for radiators, mosaic and ceramic tile paper, mesh used in burlap bags in which onions are packed, the catalogue of Montgomery-Ward, carpet twisting paper, trade marks for overalls and stockings, panels and door pockets used in Ford cars, and Globe-Wernicke files. The company responsible for the manufacture of these products was incorporated in December, 1899, and was later consolidated with the W. B. Oglesby Company to form the Sorg-Oglesby organization. The same corps of officers serves both units.

The Raymond Bag Company, a factor in the city's industrial situation since 1896, manufactures bags for flour, plaster, cement and other dry products. Up-to-date equipment and a large building will provide interest to the tourists.ists.

The Gardner-Harvey Company, the result of the consolidation of the Colin-Gardner Paper Company, incorporated in 1900, the Gardner-Harvey Paper Company, incorporated in 1908, the Gardner Paper Board Company, 1916, and the Gardner and Harvey Company, 1918, manufactures fibre boxes used for many nationally known products.

The Crystal Tissue Company, located in Excello, but considered with the mills of the city, has a daily output equivalent to a strip of tissue paper one foot wide by 3000 miles long. Among the articles in which Crystal tissue paper is used are kites, balloons, paper twine, excelsior for Easter baskets, paper flowers, caps, dress patterns, wrappers for beds in shipment, and wrappers for metal. Tissue paper of 60 different hues is manufactured.

Other paper mills in the vicinity which will probably be open to the visitors are the Wardlow-Thomas Paper Company, and the Wrenn Paper Company, both old in the industrial history of the city, the former having been incorporated in 1885 and the latter in 1858.

Programme Thursday, May 22, 1924

8:00 A. M. Registration at the headquarters. (Miami Hotel, Dayton, O.)

MORNING SESSION

9:00 A. M. Opening Address.....President Nelson R. Davis
Address of Welcome.....Mayor Frank B. Hale
Response .....B. T. McBain
Apprenticeship in Paper Making.....
.....Geo. P. Hambrecht
Vocational Education.....Harry P. Carruth
Employment Problems.....Frances S. Pope
Building and Maintaining an Organization..
.....Robt. B. Wolf

12:30 P. M. Buffet Luncheon at the Miami Hotel, Sponsored by The Geo. H. Mead Co. and The Newsprint Division.

AFTERNOON SESSION

1:30 P. M. Our Part in Forest Conservation....C. L. Cecil
Paper Making Fibres.....B. S. Summers
Steam and Power for Pulp and Paper Mills
.....H. S. Taylor
The Beater of Today.....Charles Shartle
The Drying of Paper.....E. P. Gleason
The Selection and Abuse of Felts..M. C. Burrell

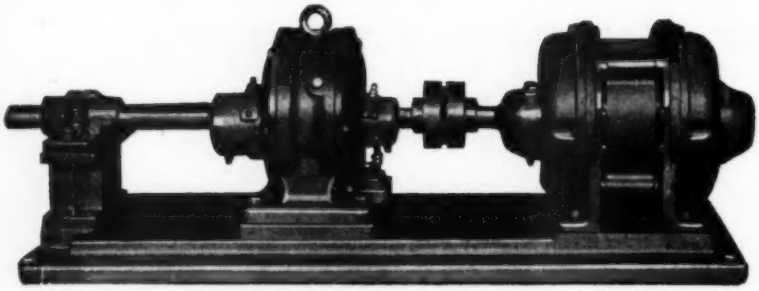
EVENING SESSION

7:00 P. M. Banquet and Entertainment, Sponsored by The Allied Industries. At the Miami Hotel, Dayton, O.
Toastmaster .....George H. Mead
Address .....Sherman Rogers
Monologue .....George Mann
Acts from Keith's Vaudeville.

Program for the Visiting Ladies

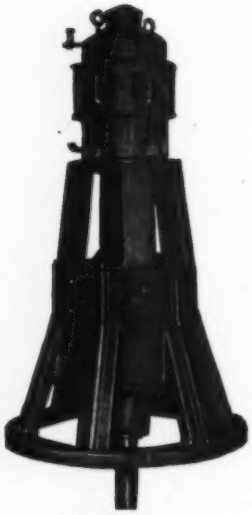
After registration and the opening of the morning session, the ladies will be in charge of a special committee who will look after their welfare and entertainment.

Automobiles will start from the hotel for a drive around Dayton and its environs, stopping at the National Home for the Disabled Soldiers (a most beautiful and well kept home for those who fought in all wars), where they will be served luncheon at noon.



Horizontal Type

Worm Gear Type



Vertical Type

James Speed Reducers

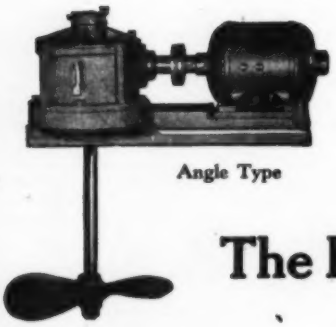
¶ James Speed Reducers are not limited, in their application to your requirements, to any single type.

¶ No matter how difficult may be your problem of speed reduction, a James Speed Reducer can be applied that will show high efficiency and give complete satisfaction. There is a specific field that is served by each type.

¶ They are built by pioneers in the manufacture of Speed Reducers and represent the highest type of engineering and manufacturing practice.

¶ Our engineering department is at your service in helping you apply the proper type of Speed Reducer to your equipment.

¶ Our Catalogue No. 8 shows numerous applications and gives complete information regarding out entire line.



Angle Type

The D. O. James Manufacturing Co.

1120 West Monroe St., Chicago, Ill.

20

D.O.JAMES

They will then start on further sightseeing trips; among the places will be the Conservency Dams near Dayton, which were built for the prevention of floods, The McCook Aviation Field, also passing the Wright Aviation Field.

At five o'clock they will meet the men folks of the convention at The National Cash Register School House, where the children of The Patterson Memorial School will present a most wonderful pageant along patriotic lines.

After this feature they will prepare for the evening dinner at the Miami Hotel.

Friday, May 23, 1924

MORNING SESSION

9:00 A. M. Recording Devices Used in Pulp and Paper Making .....M. A. Goetz
Tinting of White Paper.....John R. Roberts
Paper Making from Bagasse.....C. W. Mason
Report of Apprenticeship Committee.....
.....J. S. Schumaker
Business Session
The Future of the Association..Nelson R. Davis
Election and Installation of Officers
12:00 Noon—Adjournment to Middletown, Ohio, by automobiles.
1:00 P. M. Luncheon at The Manchester Hotel.
2:00 P. M. Sectional meetings as follows:
Newsprint Division at The Manchester Hotel.
Board Division at The Gardner-Harvey Paper Company.
Coarse Paper Division at The Manchester Hotel.
Book and Fine Writing Paper Division at The Sorg Paper Company.
Chemical Pulp Division at The Manchester Hotel.
6:00 P. M. Adjournment to The Dayton Country Club, Oakwood, Ohio.
7:00 P. M. Dinner and Inspirational talks, sponsored by The Miami Valley Paper Manufacturers Association.
Toastmaster .....Arthur H. Nevius
Inspirational Talks by—Thurman (Dusty) Miller
Col. M. G. Collins
and others
Music by The Lewis Becker Orchestra and The Dutch Club of Dayton, Ohio.

Program for the Ladies

The morning will be spent in the down-town district, visiting the department stores, etc., and at noon they will meet on the sixth floor of The Rike, Kumler Company, where luncheon will be served in the Main Dining Room.

After lunch they will go by automobile to the National Cash Register Plant where they will be conducted through this wonderful industrial institution, and will be entertained with a lecture and moving pictures.

From there they will go to the South Aviation Field where they will be given free Air Ship rides by The Whelan, Rinehart Company.

Dinner will be served to them at the "Old Barn Club" which is located in the Hills and Dale Park, at six o'clock. The evening entertainment will be made in the form of a theatre party.

Saturday, May 24, 1924

Everybody will assemble at the headquarters between 8 and 9 A. M.

Those wising to visit the plants of the Mead Pulp and Paper Company and the Chillicothe Paper Company, at Chillicothe, Ohio, will leave the Miami Hotel about 8:30 A. M.

The visitors who will want to see the Orr Felt and Blanket Company plant, will leave the hotel at 8:45 A. M. and will go via special traction cars, which will be provided.

Arriving in Piqua, Ohio, they will be the guests of this company and will be shown through the felt mills and how felts, blankets, etc., are made, after which they will be entertained with luncheon in their cafeteria. Return to Dayton will be made by the special cars.

Visitors who want to visit the National Cash Register plant must do so on Saturday morning, as the plant closes at noon.

The visit there will start at ten o'clock, leaving the hotel about 9:30 A. M.

Automobiles will be provided for all visitors who wish to visit the plants of the Allied Industries and the Paper Mills in Dayton and in the entire Miami Valley district, also to any points of interest that is required.

Registration for making these visits will be taken care of by the committee and should be made at the time you register at the headquarters, in order that proper provisions can be made for your comfort.

Cutless Bearings in the Paper Industry*

By MR. C. F. SHERWOOD
B. F. Goodrich Rubber Company

IT WOULD probably not be amiss in the beginning to point out briefly the resisting power of rubber to wear and abrasion. This fact is frequently overlooked by the laymen as well as by the engineer when considering material which will stand excessive wear and abrasion.

One of the least known examples of wear on a rubber surface is that of the pavement of King George's court, London, England. This court was paved thirty-eight years ago with a rubber paving, and it has had during that entire time the full travel of a busy city street, first, of course, being subjected to horse drawn vehicles, and more lately to motor travel. The maximum amount of wear shown on this pavement during its thirty-eight years of life is one-eighth of an inch. This is an exceedingly remarkable showing when you consider that the stairway from the street level of the new Equitable Building in lower Broadway, New York, leading to the subway entrance now shows a wear due to human feet alone of one and an eighth inches since the building was built only a few years ago.

This fact of long wear and service of rubber has been recognized more readily in England than it has in this country so that there are at the present time in Edinburgh, Scotland, nine blocks paved with rubber, seven blocks in Glasgow, all the bridges across the River Thames are paved with rubber, and they are now laying a rubber pavement around the cenotaph, that memorial to the unknown soldier, in London.

Another use of rubber clearly demonstrating its powers of resistance to abrasion and cutting is that of the well known cement gun. Prior to the discovery that a soft rubber nozzle was the ideal nozzle to use with the cement gun, experiments had been made with practically all known substances, even drilled diamond, but the abrasive effect of cement and sand expelled from a nozzle under the pressures in use in a cement gun, readily wore out even the diamond and made it impossible to make use of all hard substances for this purpose. It was only when soft rubber was adopted for these nozzles after years of experimental work that the cement gun became the success that it has in the commercial field.

If you will stop and think there is only one thing that will contain and hold a sand blast. All the hard steel or iron pipes in the world would not stand up under the conveying of a sand blast. It is the soft, resilient rubber lining of sand blast hose which makes the blasting of the innumerable castings of the American manufacturers a possibility. It is the extreme resistance to abrasion of rubber that makes it the only satisfactory substance for this severe service. It is this property of rubber that I wish you to hold in mind.

I now wish to bring to your attention the Cutless Rubber Bearing. Usually when I say rubber bearing, most everyone looks at me and says, "Of course, hard rubber," and then I in turn reply, "No, soft rubber." Then a look of incredulous amazement spreads over their faces and is followed quickly by a look that as much as says, "I'm sorry the poor chap is afflicted." And I assure you that I am perfectly used to being taken for a crazy man. As the inventor of a rubber bearing I have gone through four years of introductory work with this bearing, and during that time on many, many occasions have I noticed that look of amazement come over my auditor's face when I mentioned the fact that the bearing had a soft rubber surface, and many times I have had engineers look at me in amazement and make the remark, "Well, why not make it of cheese?" But fortunately after they had listened to the point of the rubber bearing, they saw for themselves that it is not quite as far fetched an idea as it seemed to be at first blush. Furthermore, after four years of continuous use, the rubber bearing has proved itself beyond all question to be better fitted for certain conditions than any other bearing now on the market.

The rubber bearing was primarily developed as a bearing for sand or slime pumps for the mining field, and at this point I wish to say that I apologize for appearing before a meeting of paper mill superintendents because all of my experience has been directed toward mining, and for the past twenty years I have been engaged in mining operations throughout the world. I must confess that I have but a limited knowledge of the manufacture of paper, and that only in a very superficial way, so I trust that you will pardon any misstatements I may make or any unfortunate use of terms with which I am not particularly familiar.

It was the years that I spent in the mining industry that prompted the invention of the cutless bearing. Operating

*Address delivered at the Michigan Division meeting of the Paper and Pulp Mill Superintendents, February 21, 1924, at Kalamazoo, Mich.

U. S. Patents: Dec. 10, 1918, and June 7, 1921.
Canadian Patents: July 5, 1920, also Patents Pending.

Are You Trying to Pull a Greater Production?

THE Fulton System is an elephant for increased production—not one of the many installations of the Fulton Forced Vapor Circulating System has failed to increase production at decreased costs.

The Fulton System is a thoroughly tried, efficient and economical method of removing all the water and air from paper machine dryers; even if a small quantity of water or air is present in the dryers, you can never reach your possible maximum drying capacity, and some are unaware that this condition exists in their dryers.

Let us analyze your paper machine production—it will cost you nothing—think of the tons you are losing in under-production due to stagnant dryers.

FULTON ENGINEERING COMPANY

MIDDLETOWN, OHIO

Specializing in Paper Drying

many sand pumps handling quantities of sand and water, and being constantly troubled on account of bearing wear and shaft cutting, I finally evolved the cutless rubber bearing, and let me say in this connection that when I first brought out the cutless bearing I did not dream that its application was nearly as wide as it has proved to be.

Proven Ideal for Marine Use

The first application of cutless bearings, as I have stated, was for sand pumps in mining operations. It soon developed that these bearings had a wide application for pumps of other characters, such as deep well pumps and pumps handling water under high head, and next came the application of these bearings to the marine field for stern tubes and strut bearings on vessels. In this connection it might be well to draw your attention to the most modern vessel for commercial purposes that has yet been launched on the Atlantic sea-board. This is a Standard Oil tanker, launched by the Newport News Ship Building Company the first of this year, and is equipped with Diesel electric drive, being the first boat of this character launched for commercial purposes, although the navy has made use of this form of drive in battleship propulsion. This vessel is equipped with a cutiess bearing in its stern tube, the bearing taking a nine and three-quarter inch shaft, and supporting a ten foot bronze screw. The total weight resting upon the bearing is 5,500 pounds dead weight, and its length is two feet, nine inches. The diameter and length of the bearing are identical with the lignumvitae bearing which would have been installed were it not for the fact that the Standard Oil Company of New Jersey insisted upon the installation of a cutless bearing on this craft, after their experience with cutless bearings under various severe operating conditions out of the port of Baltimore on other oil tankers that they are now running equipped with cutless bearings. We feel exceedingly proud of the fact that this most modern vessel is equipped with a cutless bearing, especially as it was so equipped because of the long life and excellent service that cutless bearings have given this company.

The first installation of cutless bearings for marine work was on the state harbor tug, "Governor Stevens," owned by the state harbor commissioners of the state of California, and operating in the sand and silt of San Francisco Bay. This vessel has been equipped with cutless bearings for over two years and eight months, and has been operating continuously during that time in the dirty, silty water of San Francisco Bay. The usual life of a lignumvitae bearing under these conditions is about six months, but the original cutless bearing installed at the time of the launching of this boat is still in service and shows no signs of wear either upon itself or upon the shaft which rotates in it.

When you consider that such firms as the Standard Oil Company of New Jersey, the Worthington Pump and Machinery Corporation of New York, the William S. Cramp & Son Ship and Engine Building Company of Philadelphia, the Chicago Pump Company, the Aurora Pump & Machinery Corporation, and the Krogh Pump & Machinery Corporation have entered into contracts for a period of seventeen years for the use of cutless bearings, I believe I am justified in saying that the cutless bearing has long since passed the experimental stage.

The cutless rubber bearing is very simple in construction, being a cylinder of brass or other metal lined with from 5/16 to ⅜ inch of soft Olivite rubber, the thickness of the lining depending upon the diameter of the shaft and bearing. This soft rubber carries a helical groove, which permits of water entering the bearing for lubrication and also provides a means of exit for any sand or grit that may work in with the water.

Probably the first objection that comes to your mind when a rubber bearing is brought to your attention is that rubber has a high co-efficient of friction. This is true if rubber is dry; but scientific tests in the laboratories of Columbia University and of Stanford University of California have proven a wetted rubber surface to have a lower co-efficient of friction than an oiled babbitted surface. This property of low co-efficient of friction of a wetted rubber surface will probably be emphasized when I remind you of the time that you happened to step upon a smooth manhole cover during a rain storm, with rubber heels on. You will distinctly remember that the co-efficient of friction between your heel and the smooth metallic manhole cover was decidedly low and that you probably sat down with a great deal of force. Another homely example illustrating this extreme low co-efficient of friction on wetted rubber is the time that you may have driven your automobile in the car tracks on a wet day. You applied the brakes suddenly and found to your surprise that the car's acceleration was not materially decreased and even though the rear wheels were locked your car slid merrily along its way on the steel rails wetted and in contact with the rubber tires of your machine.

Not Affected by Sand or Grit

You have heard me make the statement that cutless bearings will not be cut out by any sand or grit that may enter the bearing, neither will the shaft which operates in such a bearing become scored, and you ask yourselves how this is possible. You will notice that the soft, smooth surface of the Olivite rubber is extremely resilient and it is due to this resiliency that this phenomenon occurs. It is impossible to imbed in this rubber surface a piece of sand or grit. Consequently being unable to imbed itself in the bearing surface, the particle of sand or grit rolls to the groove and is carried off by the flow of water through the bearing. In a babbitt or bronze bearing, when sand or grit enters the box, it becomes inbedded in the softer bearing material and being so imbedded there is only one way that it can be eliminated, and that is by obtrusion and wear, during which process the shaft becomes scored and cut, in turn cutting and wearing the bearing itself. In the cutless bearing such a condition cannot exist. As long as water is provided for lubrication, we do not care how rough or how severe the bearing operation is. There is just one thing that cutless bearings require, and that is water for lubrication. You would not think of running a babbit or bronze bearing without an oil film; likewise do not expect a cutless bearing to operate without a water film. Water is to a cutless bearing what oil is to a babbitt or bronze bearing. It is the lubricant, and it supplies the film which reduces the friction and renders the bearing operative.

The next question that is usually asked me when the subject of rubber bearings is brought up, is what load a rubber bearing will carry. We have them operating at the present time under loads as high as 350 pounds per square inch of projected bearing area. This is very far in excess of good bearing practice, and from what little I know of paper machinery is far in excess of anything occurring on a paper machine. I am also frequently asked at what speed these bearings operate. We have them operating at as high as 5,000 revolutions per minute. We also have them operating as low as one revolution in fifteen minutes.

There is no size limitation in building cutless bearings. They are built from a half inch diameter to thirty-eight inches in diameter, and while we advocate the use of the solid bearing, these bearings can also be furnished in split or half bearings. Wherever it is possible we sincerely advocate the use of the solid, cylindrical bushing as it is easily replaced and is cheaper from the standpoint of the operator. However, we realize that under many conditions it is impossible to use a solid bearing, and for these conditions we furnish half bearings of all sizes and lengths.

In figuring on the use or adaptation of cutless bearings on new equipment, there is one point which must be borne in mind, and that is, that it is necessary to have not less than five-sixteenths of an inch of rubber in the bearing surface. This is necessary because the cutless bearing depends upon the resiliency of the rubber for its operating quality and if this rubber is less than five-sixteenths, the stock becomes so hard that it is impossible to get the resiliency and the long life from rubber bearings that we do get with sufficient stock in the bearing wall. For small bearings up to and including two and a half inches the safe way in figuring the outside diameter of a rubber bearing is to figure shaft diameter plus seven-eighths of an inch, this giving you the outside diameter of a rubber bearing with a one-eighth inch brass shell, suitable to be placed in any box. In holding these bearings in a box many methods are used. Any of the well known mechanical means of securing a bushing to a boxing are satisfactory, such as bronze screw, tee, pin, or dowel, in fact any mechanical means that is used at present for fixing solid bushings to journals.

As I said before, I have had very little experience in paper mills, but what I have seen of the wet ends of the paper machines in the mills that I have been in in the past month or so has convinced me that cutless bearings have a very wide application in this field. You have water constantly on the wet end of these machines, and it seems to me that there is more or less difficulty in maintaining lubrication properly on an oil or grease bearing where so much water is present. If this is the case why not substitute a bearing that requires water for lubrication and eliminate grease entirely from that end of your mill? I believe from what I have been told by paper men in the field that this would have an added advantage, as I understand that the use of grease at times causes you considerable trouble on both your wires and felts, and I can assure you that by the adoption of rubber bearings this serious difficulty will be eliminated.

We are now installing many experimental sets of cutless bearings at different points in various paper mills, and we expect very shortly to be able to say that we have entirely replaced the ordinary bearing on the wet end of Fourdriniers.

ALABAMA OPPORTUNITIES

Five Fundamentals

OF THE

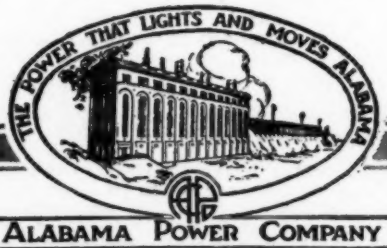
Paper Making Industry are found in Alabama

These are—

Availability of Raw Material—Abundance of Hydro-Electric Power—Proximity to Markets—Suitable Labor—Ideal Climate

1. **Raw Material:** Along the banks of Alabama rivers—the Coosa, Tallapoosa, Warrior, Tennessee and Alabama—both pine and gum abound. The satisfactory use of Southern yellow pine for manufacturing unbleached pulp for Kraft paper and container board is shown by the existence of Southern pulp mills with a total daily capacity of 400 tons. New machinery now being built or installed assures that the capacity of the South for making Kraft paper will soon be doubled. Proximity of this standing pine and gum to Alabama streams enables the manufacturer to raft his timber to the mill.
2. **Hydro-Electric Power:** 400,000 horsepower is available to Alabama industries. Dams now building will increase this to 600,000 horsepower. 2200 miles of transmission lines furnish adequate distribution facilities.
3. **Markets:** Points in Alabama are closer to the great purchasing centers of the Middle West through the Ohio and Mississippi gateways than are the mills of New England and Canada. There is also a shorter haul to Eastern markets than have the mills of Michigan and Wisconsin. Rail service—never hampered by severe winters—insures quick and satisfactory deliveries. The **purchasing power of the south has also increased 50%** in the last 10 years, with every indication that the next 10 years will see a still larger growth in the home demand.
4. **Labor:** A suitable supply of Anglo-Saxon native labor, giving a full day's work for its wage, is one of Alabama's outstanding assets.
5. **Climate:** Alabama's climate is ideal for high production. Labor is able to work every day in the year, as it is never shut in by long, drab winter days. Logging operations can be carried on the year around.

THE PULP AND PAPER INDUSTRY OF THE FUTURE FINDS ITS LOGICAL LOCATION IN THE SOUTHERN PINE BELT.



ALABAMA POWER COMPANY
BIRMINGHAM, ALA.

You, gentlemen, of course, are far more familiar with your bearing troubles than I am, and I would appreciate any suggestions that you might have as to the application of these bearings in the various operations in a paper and pulp plant. I can assure you, however, that I am going to know more of the paper industry than I do at present, for it seems to me that this industry offers us one of the largest fields of application for cutless bearings that it has been my pleasure to observe for some time.

Not a New Discovery

Cutless bearings have been manufactured for four years. For the first three years they were manufactured on the Pacific coast by the Oliver-Sherwood Company of San Francisco, of which firm I am a member, and for the past year they have been manufactured by the B. F. Goodrich Rubber Company of Akron, Ohio, who exclusively control the manufacture and sale of these products under a licensed agreement from the Oliver-Sherwood Company; and it is the B. F. Goodrich Rubber Company which sell you and absolutely guarantee cutless bearings. They guarantee you four times the life of any other bearing, provided water is maintained as a lubricant for cutless bearings, with no reservations as to the amount of sand or grit that these bearings may be subjected to. There is just one thing that we ask for these bearings, and that is that a water supply be maintained through them, not necessarily a large amount of water but just sufficient water to maintain the film between the rotating part and the bearing surface, just as I have said before that you would expect to maintain an oil film between your shaft and the bronze or babbitt bearing. This I do not believe would be a hardship in your plant because you have running water constantly at the wet end of your machine at practically all points where bearings operate.

Cutless bearings can be supplied with brass, bronze, steel, or cast iron shells, and for special conditions your own journal boxes may be lined with the Olivite rubber compound. We are furnishing cutless bearings at the present time for whipper rolls, table rolls, felt rolls, breast rolls, press rolls, deckle strap wheels, wire rolls, etc., and we expect very shortly to have the pleasure of announcing that there is no point on the wet end of a machine that we cannot take care of. We also firmly believe that there are many other places such as beaters, screens, jordans, pumps, etc., throughout the paper mill where cutless bearings will be found advantageous to use.

It may interest you to know how these bearings are manufactured, for the manufacture of these bearings has not been as simple as the finished product would indicate. When the idea of the cutless bearing first struck me, the simplest method of manufacture that occurred to me was that the bearing could be molded and for a year and a half we experimented on the Pacific Coast with this idea in mind. We found, however, that it was impossible to control the rubber to the degree of accuracy which we wished for the bore of the bearing, as many of our bearings are fitted to a one thousandth inch clearance. It therefore became necessary to evolve some more accurate method of manufacture. The method now in use is first to line the cylindrical tube with the rubber compound with a smooth mandrel in contact with the bearing wall. The rubber is then vulcanized to the bearing shell, during the process of vulcanization developing approximately five hundred pounds pressure per square inch. When this operation is finished, we have a cylindrical tube completely lined with soft Olivite rubber, not entirely smooth, nor grooved. The cylinder is then chucked in a lathe and a special grinder grinds the helix. The grinder spindle operates at 18,000 R.P.M. and has a toothed milling cutter on the end which cuts the helix. Then a wheel of No. 40 Norton grit is used to true and smooth the inside diameter of the bearing.

It has been found in this work that high speeds are necessary to get a perfect finish on a rubber surface, and in this connection I might say that this, I believe, is of interest to the paper mill industry, as you have, of course, a large number of rolls in use throughout your plants which you are frequently grinding. It has been our experience where rubber has to be ground that high speeds materially increase the efficiency of the grinding operation and also give an infinitely smoother and better surface than low speeds, so that it is at 18,000 R.P.M. that these bearings are ground and grooved. After grinding they are tested with a gauge to check up inside and outside diameters, making sure that these two diameters are concentric.

We feel that since cutless bearings have been such a success in both the pump and marine field they will also prove a success in the paper mill industry, and I ask from you your co-operation and wish to thank you for your tolerance and courteous attention to one who knows so little of your industry, but who really believes that cutless bearings will assist you to solve some of your operating difficulties. If there are any questions that you would like to ask relative to cutless bearings I would be only too glad to answer them, and I wish to take this opportunity to thank Mr. Gilman, president of your section, and Mr. Parent, the secretary, for the opportunity of addressing you.

Now, if there are any questions, I am only too happy to answer them.

Discussion

Question by Mr. Charles G. Bard—In grinding the bearings at such a high speed, how do you take care of the heat and get the fine rubber away from the grinder?

Answer—A jet of high pressure air constantly plays on the grinder, thereby keeping the tool cool and also removing any of the fine dust and cuttings from the grinder base.

Question by Mr. Clarke (Kalamazoo Vegetable Parchment Company)—Have you thought of the adaptation of these bearings to beaters? I believe there is an opportunity for installing them there.

Answer—Not being familiar with beaters, the only thing that I can say is that if there is plenty of water, the cutless bearing will take care of your condition.

Mr. Clarke—There is lots of water and slop and this gives us trouble in maintaining efficient lubrication.

Answer—Then undoubtedly the cutless bearing will assist you in meeting this condition.

Question by Mr. Coughlin (Allied Paper Mills)—I should think cutless bearings could well be used on Jordan engines except for the question of thrust.

Answer—If you have at present a suitable device for taking care of thrust, as I believe you have, then cutless bearings can be used with perfect satisfaction.

Question by Mr. Parent (Western Board & Paper Company)—Can they be used on the cylinder molds of a board machine?

Answer—Absolutely, just so enough water is permitted to enter the bearing to keep it lubricated.

Question by Mr. Clarke—If these bearings will stand up under grit, I should think they could be used on clay tanks.

Answer—It would be an ideal place for them, as the clay will positively not affect the life of bearing or shaft.

Safety Men to Meet in Cleveland

Preparations have been completed for the joint safety conference to be held in Cleveland May 16 under the auspices of the engineering section of the National Safety Council, the Cleveland Engineering Society and the Society of Ohio Engineers. The morning and afternoon sessions will be held at the Winton Hotel.

The following program is announced:

MORNING SESSION—10 A. M.

General Topic—Safety Legislation and Codes.

Chairman, W. N. Fitch, the Fisher Body Ohio Company, Cleveland.

1—Development of Ohio's workmen's compensation law and codes—John Patterson, Hydraulic Pressed Steel Company.

2—Medical requirements of the workmen's compensation law—Dr. A. G. Cranch, National Carbon Company.

3—Application of the new penalty clause of the compensation law—J. M. Woltz, Youngstown Sheet and Tube Company, President, Society of Ohio Safety Engineers.

General discussion led by H. H. Hamm, Cleveland Builders Supply and Brick Company.

AFTERNOON SESSION—2 P. M.

General Topic—Plant Housekeeping.

Chairman, Rodney Morrison, Jr., National Carbon Company.

1—Illumination and proper painting of interiors—Walter Sturrock, National Lamp Works of General Electric Company. Discussion.

2—Dust collection—F. C. Allen, Allen and Billmyre Company, Inc., New York City.

3—Floor plans with regard to aisles, machines, material and men—E. W. Hulet, Consulting Engineer, Cleveland.

General discussion, including proposed requirements of the new national code on Walkway Surfaces.

INFORMAL DINNER—6:30 P. M.

Chairman, Frank A. Scott, President, the Warner & Swasey Co., President, Cleveland Engineering Society.

Toastmaster, Clarence L. Collens, President, Reliance Electric & Engineering Company.

1—Safety and the courts—Honorable J. J. Sullivan, Judge, Court of Appeals, District of Cuyahoga County.

2—Forethought vs. Afterthought in Safety—Dr. R. M. Little, Chief, Bureau of Rehabilitation, New York State Department of Education.

Music by the Fisher Body Ohio Company's Bagpipe Quartet, vocal soloist and community singing.

Appleton

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Cylinder Wires

Save-All Wires

Washer Wires

In Brass and Phosphor Bronze

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Appleton, Wis., U. S. A.

Early Days of New York Papermaking

The Remington Mills—Dominating Factor in New York's Papermaking History

IN THE early history of the paper industry in northern New York there is no name that figures more prominently than that of the Remingtons. The string of pulp and paper mills along the Black river, near Watertown, and the group of mills on the Racquette river in St. Lawrence county which now are part of the St. Regis group testify to their genius for organizing and operating paper mills. Members of three generations of the family were engaged in paper manufacture in northern New York. Alfred D. Remington was the real pioneer of the family, although his father, Illustrious Remington, was associated with him for years. Alfred's brothers, Hiram and Charles R., and the latter's son, Charles H. Remington, also left their influence upon the paper trade.

A. D. Remington was known throughout the paper mill world as one of the pioneers in the wood pulp industry in the country. In a mill on Sewall's island, in Watertown, Mr. Remington made the first paper exclusively from ground wood and sulphite that was made in the United States. He was likewise the first paper manufacturer in the country to speed up his machines. When other manufacturers thought it was impossible to run faster than 35 feet per minute, Mr. Remington was operating his machines at 50 feet. In the period about 1868, when other manufacturers had coaxed their machines up to a speed of approximately 50 feet, the Watertown mills had reached 100 feet, and Mr. Remington's accomplishment was one of the wonders of the industry, the feat being widely heralded. Mr. Remington accomplished this not by improvements in machinery but in methods. He was a very aggressive man and he imbued his employees with some of his spirit. He saw to it that each man knew his job thoroughly.

The Remingtons were conducting three paper mills on Sewall's island, Watertown, when Warner Miller of Utica demonstrated the practicability of using wood pulp in the manufacture of paper. A. D. Remington was quick to seize upon the idea and in 1869 he installed grinders in one of the mills and set about making the wood pulp. The wood grinders were crude affairs, and mills which installed them had to pay a royalty on each ton of pulp because of patents. But with the inconveniences and the cost the new method was found to be cheaper than the old method of using all rag or paper stock.

Visits Europe to Learn New Methods

In 1884 Mr. Remington went to Sweden and Germany to learn of the process by which paper could be made without rags. His visit there resulted in his purchasing several tons of their sulphite fibre or chemical pulp, and sending it to Watertown to be worked up with his natural wood pulp. The experiment proved a success, 25 per cent of the sulphite pulp

Old Ontario Mill, sold to International Paper Co. in 1898

with the balance common ground pulp making a good article of paper.

Illustrious Remington and his son, A. D. Remington, came to Watertown from Fayetteville, N. Y., in 1854 and established the first mill on the north branch of Black river opposite Sewall's island. Hiram remained at Fayetteville to manage the mill of I. Remington & Son there. Charles R. Remington was in college at that time, but a short time later came to Watertown to enter the business. Four rag-beating engines and an 84-inch Fourdrinier machine were installed in an idle factory building and the mill was running in 1855.

The second Remington mill was built in 1862 by A. D. Remington at the head of Sewall's island, not far from the original mill. To operate this mill he organized the Watertown Paper Co. Sept. 20, 1862, with a capital of $14,000, and as partners in this enterprise he had Charles R. Remington and Walter D. Sewall. In 1863, A. D. Remington became the sole owner of the I. Remington & Sons mill, the original mill. On Sept. 7, 1865, he organized the Remington Paper Co., the capital of which was $30,000, and with him as incorporators were Wooster Sherman, Fred Emerson, L. R. Murray and Washington Gannett. In 1867 the original mill was removed from the north shore of the Black river to Sewall's island, and in 1869 the first wood pulp machinery was introduced. From that time, for 15 or 20 years, there was a constant increase in facilities and capacity until the company operated two larger paper mills, three wood pulp mills and one sulphite

The "C. R." Mill at Glen Park, sold to International Paper Co. in 1899

fibre mill. The company in 1874 had bought the factory building which housed the original mill and had re-established a paper mill there. In all the mills there were 21 grinders with an output of 40 tons of ground wood daily, while the sulphite mill produced 20 tons of chemical fibre a day. There were four Fourdrinier machines with a capacity of from 32 to 36 tons a day. The capital invested, including 26,000 acres of Adirondack land, was estimated at $1,350,000.

Soon after the Watertown Paper Co. was organized the Sewall interest was sold to Edward Victory. In October, 1868, A. D. Remington sold his stock to Hiram Remington and Margaret S. Remington, his wife, who had come here that year from Fayetteville. In 1881 C. R. Remington sold his interest in the company to Edward Remington, son of Hiram Remington. In 1868 the capital stock was increased to $20,000 and in 1890 to $50,000. About 25 tons of newsprint paper and manila paper were manufactured daily.

Start the "C. R." Mill

The fourth enterprise to be launched by the Remington family came in 1881, when Charles R. Remington sold out his interest in the Watertown Paper Co. to his brother, Hiram, and with his son, Charles H. Remington, who had graduated from high school only two years before, bought the water power at Jim Wood's falls, at Glen Park, about two miles below Watertown, and began the development of it and the erection of a paper mill. Charles H. Remington, although only 22 years of age, had had a thorough training in the paper industry, having been a helper in the mill of the Watertown Paper Co. while he was still a student in high school. He became one of the geniuses of the industry in northern New York and in future years he was to take many wasting water powers, harness them and turn them to the production of paper. It is said that before he left school he often wandered along the bank of the Black river near the Jim Wood's falls and dremed of the time when he might develop them.

Pulp was first made in this mill in June, 1882, and paper was produced the following September. The mill was operated under the firm name of C. R. Remington & Son, and the "C. R." mill, as it has always been known, was one of the most

Oliver Progress

Stock recovery in excess of 95%—low operating cost—minimum floor space and but little attention required, handling 576,000 gallons of liquor in 24 hours—that's the record of the Oliver 6' x 6' save-all now offered to manufacturers of paper.

The Oliver is a notable achievement—another milestone in Oliver progress.

Utilize the Oliver to reduce costs and return a larger net profit.

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Specify OLIVER

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501 Market St.

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33 W. 42nd St.

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11-13 Southampton Row, W. C.

successful enterprises along the river for many years. Business was good and costs were not prohibitive, and it has always been said that the mill paid for itself out of the first year's earnings. The mill was constructed for two machines, but in the first few years after it was erected a new concrete building was built in which was installed a big machine, making three in all for the plant.

A short time after C. R. Remington & Son built the "C. R." mill at Glen Park, the Remington Paper Co. of which A. D. Remington was still the guiding factor, saw the advantages of the power at Glen Park and built a pulp mill only a short distance up the river from the C. R. mill. After a few years the construction of a paper mill was begun, with provision for a 132-inch machine.

Last Plant of Remington Interests Built

Still one more Remington company was organized before the principal plants of the various Remington concerns in the vicinity of Watertown were purchased by the International Paper Co., putting an end to the domination of the industry near Watertown by the Remingtons. With this purchase the connection of the family with the industry in northern New York practically ceased, only to spring up a few years later along the Racquette river in St. Lawrence county.

In 1886 Hiram Remington and his son Edward organized the H. Remington & Son Pulp and Paper Co. and built a pulp mill at the village of Black River, six miles above Watertown. The mill cost about $100,000 and furnished pulp for the Watertown Paper Co. This property was sold to John B. Taylor in 1904. Mr. Taylor continued the manufacture of pulp for a short time, but later developed the power at that site hydro-electrically. The station is now a part of the system of the Northern New York Utilities, Inc., of Watertown, controlled by Floyd L. Carlisle, president of the St. Regis Paper Co.

The sketch of the Remington mills shows how closely related the various properties were and the position of influence which the family occupied in the industry. At the time at which these mills were flourishing there were few other mills of importance along the Black river.

Sells to International Paper Co.

When the International Paper Co. was in the process of its early development its officers cast their eyes over northern New York to see if there were any valuable mills that they might add to their rapidly growing string. Their glances naturally rested upon the mills of the Remington family, and in 1899 negotiations were completed which transferred to the International practically all of the Remington holdings. The sale was consummated March 1, 1899, and included the property of the Remington Paper Co. and the C. R. Remington & Son property, the Watertown Paper Co. remaining in the hands of Hiram Remington. That property was later owned by the Cylinder Paper Co. and is now a part of the property of Hinde & Dauch.

The Remington Paper Co. sold to the International two paper mills with four machines at Sewall's island; two wood mills, one on the north bank and one on the south bank of Black river, opposite Sewall's island; the sulphite plant at Sewall's island, and the wood plant at Glen Park, together with the Glen Park paper mill which was in process of construction.

The C. R. Remington & Son property included the Glen Park paper mill with two machines and additional concrete mill just constructed, with 132-inch machine; a wood pulp mill and the plant of the Glen Tablet Co. at Glen Park. Splendid water power and 37,000 acres of land in Lewis, St. Lawrence and Herkimer counties were also included.

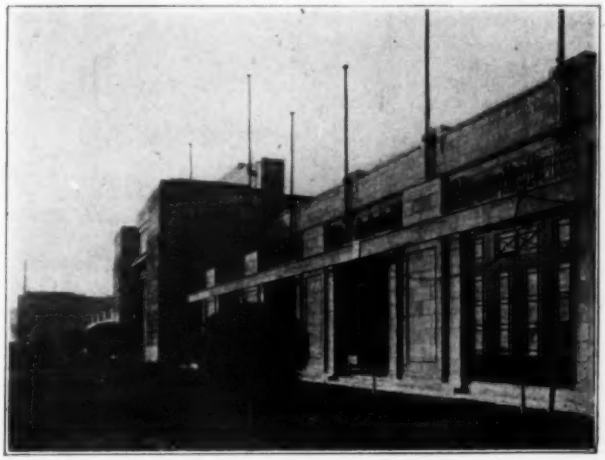
Miniature Paper Making Plant to Be Installed at British Empire Exhibition

By A. EDWARD HAMMOND

FOR the first time in the history of Great Britain the story of how paper is made is to be told to the general public at the great British Empire Exhibition which is being held at Wembley near London, from April 23rd to October. Wembley Park was a very short time ago nothing more than a stretch of beautiful country land, it has now been converted into a town of palaces and gigantic engineering constructions, in fact a new city has risen up for the housing of this colossal exposition.

In connection with paper, it is interesting to know that although beautiful and intricate machinery is used in turning out paper to-day, there is a part of the British Empire which will be represented at Wembley, where paper is still made with the primitive tools which were in use thousands of years ago. This is Kashmir—the most northerly province of India. For seven hundred years, Kashmir was shut off from the rest of the world. During that period, when most other countries were swiftly advancing, Kashmir stood still, and when people from outside were allowed to re-enter the country, the natives were found making a rough paper by methods which have long been obsolete, even in unenterprising China.

The visitors to the British Empire Exhibition will have an opportunity of seeing how paper is made from wool or rags. They will have explained to them how rags are collected from all the corners of the earth, and brought together for the purpose of making the various kinds of paper which they use in their ordinary everyday life. They will see how its subsequent treatment determines the social standing of the paper; whether it is to live in the perfumed atmosphere of the daintily tinted *billet doux*, to become cream-laid or ordinary smooth-faced notepaper, or the uncultured and coarse grained paper of the sugar bag.



View of an exterior section of Palace of Industry at Wembley

The Paper Makers Association of Great Britain has combined with the British paper machinery builders to install at Wembley a miniature paper making plant to illustrate the whole process of making paper, from the raw material to the finished article. The visitor will see wood and rags mechanically cut and beaten into pulp and fibre, passed through the refining machines and strainers where all coarse and unsuitable material is trapped, and then passed on to the actual paper making machine which will manufacture sheets of paper 30 inches wide at 20 to 100 feet per minute.

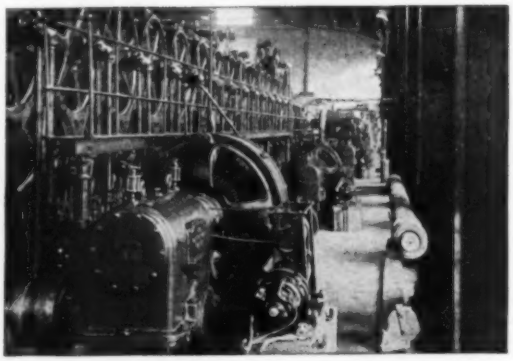
The space occupied by this miniature paper making plant is 100 feet long and 20 feet wide. The machine is placed in a bay in the Palace of Industry, and grouped around it will be the exhibits of the leading printing, stationery, map-making, and publishing firms in Great Britain.

The Palace of Industry is one of the two great buildings of the Exhibition, (we Britishers do not refer to these big displays or gatherings as Expositions as do our American friends)—the other being the Palace of Engineering, which is probably the largest concrete building in the world. The Palace of Industry will be devoted to the display of those industries which do not come under the general heading of engineering, and the products and trades represented range from soap and chemicals to textiles, food or furniture. The section devoted to the exhibition of paper, stationery, and allied trades will occupy 11,250 square feet.

Realizing the necessity of creating interest in their section the Paper Makers' Association approached the paper machinery builders of Great Britain and asked them to combine in making their exhibit one of engineering as well as of commercial interest. The result was that the two bodies joined forces and installed this miniature paper making plant which shows all the stages in the production of paper from raw material.

An application of transportation companies for a rehearing and re-argument in the case of the Mathieson Multi-Unit Tank Car has been refused by the Interstate Commerce Commission. In a decision dated January 31, 1924, the Commission approved the Multi-Unit Car for the shipment of Liquid Chlorine and ruled that this car was entitled to the same freight rates and privileges as any other tank car. The Commission now refuses to change this ruling.

From California to Maine



Paper Machine (Sectional Drive)—Motors—25 to 50 H. P., 275 to 725 R. P. M., Reductions 8-1/5 to 1.

Note the economy in floor space required due the right angle drive, distinctly a Cleveland feature.

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THEY are using CLEVELAND WORM GEAR SPEED REDUCTION UNITS in the Paper Industry. Wherever low machine speed is desired a Cleveland can be used in connection with the more economical and more efficient high speed motor.

Dependability and Simplicity are two outstanding Cleveland features in addition to durability and compactness.

There is a Cleveland representative close to you who will gladly give you detailed information—you may have a catalog on request.

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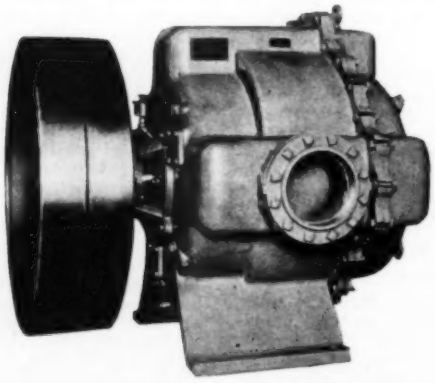
"America's Pioneers in Worm Gearing"

THE HYTOR VACUUM PUMP FOR FLAT BOX SERVICE

Vacuum Produced Absolutely Without Pulsation

No vibration

Saves Wires



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Harmony Between Superintendents and Workers

By M. N. BRISBOIS*

Superintendent, Sutherland Paper Co.

DURING the last five years we superintendents have been faithfully gathering each month at meetings. In fact, we have attended yearly conventions for the purpose of gaining as much knowledge as possible which would be of help to us in better operating the mills we are in charge of. You will admit that at every meeting we were able to get some value for our time. I claim that in every instance I have gained some new ideas which were of value to myself and to the company that employs me.

However, these meetings have mostly been in consideration of mechanical apparatus and mill equipment in general. During the past few years I have been thinking a great deal about the greater element that enters into the making of paper and which is most vital of all—the human element. For "men are like books; it is their inside I care for, no matter how badly they are bound. The half-calf or all morocco sort never appeal to me. Shelf fellows seldom handled, I call them, and a man who is not handled and rubbed up against, with a corner worn off here and there, is like a book kept under glass. Nobody cares anything about them except as an ornament." And mills have no room for ornaments.

We all have seen the best material and equipment that money can purchase, fail, chiefly because the most vital element did not function properly, not because the workers were at fault, but because they were poorly handled; that is to say, no proper organization was made effective—they were hired, turned over to a foreman, and then forgotten.

Workers need not be petted and pampered; they do not want that. They do want to be recognized for the good work they do and want promotion when they are fit to go higher.

We superintendents need only look back a few years when we first started. We can recall how we worked for the job "higher up" and how it affected our work when we failed to the promotion we had tried so hard to get by good, conscientious work. No doubt we were the victims of a foreman or superintendent who did not take enough interest in us, but preferred to hire someone from another firm who had more experience directly on that sort of a job.

Workers Should Aspire for Citizenship

I am strongly of the opinion that at least 65 percent of all jobs higher than common labor can be filled from workers on your pay roll, simply by carefully hiring the workers in the first place. After they are put to work see to it that they are placed as quickly as possible on a job for which they are best suited. The same care should be taken when hiring workers, either skilled or unskilled, as is taken when purchasing machinery or other material used in manufacturing. I believe that when hiring a worker, in case they are foreigners, to learn from them how long they have been in this wonderful country of ours, and if they have shown no disposition to become citizens, refuse them work. Occasionally this method may cause a hardship on an innocent family. Nor is compulsory citizenship based on appreciation of American ideals, but it may lend to a practical understanding with many who would otherwise remain aliens all their lives. Moral assuasion is preferable to moral force sometimes. However, the latter must assist the former. If a country is worth coming to for a better livelihood, it ought to be worth identifying oneself with as a citizen.

The placing of workers in proper jobs is not an easy matter at the start; for a man who works at the side of men with whom he can be friendly and sociable, may be either a better or a worse worker on that account. If the companionship is evil, the effect on his work is likely to be bad; if it is good, the reverse may be true. Wholly uncongenial fellow workers may seriously impair a man's efficiency, and in any case, it is good business at least to give the workers a chance to express themselves on this point if they wish to do so. Lack of such an opportunity may easily drive him to seek work elsewhere.

Proper placing of men when they first come to work tends to avert a good deal of trouble and dissatisfaction. However, by carefully keeping in close contact with the workers, a superintendent can in a short time determine his value for a given job.

Every job should have at least one good worker in process of being fitted for promotion in case of any vacancy that occurs. By this method workers will be kept in a happy frame of mind. Remember, if happy they will achieve, for achievement comes through work, labor, self-sacrifice, for the workers are there to fight their way to a higher position by trying to out-do the other fellow. It also insures you of an intact organization at all times.

We have the opportunity to develop our creative powers to the full of our ability. In mere justice to ourselves and to the best interests of our company we cannot afford not to give the same privilege to the employees, or to encourage them in the exercise of it. Indeed, it is a greater achievement to successfully direct an enterprise in which the workers are free to express their individual talents, than one in which their natural impulses in this direction are not allowed free play.

Probably no manager has gone farther with this thought in both theory and practice than Robert B. Wolf, whom you all have had the pleasure of hearing tell some of his experiences at our last meeting. His results have been based on the premise that most inefficiency, which is the advance agent of discontent and disturbance, is lack of interest. His endeavor is to create interest in the workers by making them conscientious of his relationship to the entire production process, and by supplying him with records and data that enable him to measure his mastery of the natural forces he is using.

I believe that superintendents and foremen could always get the best results by forgetting that they are bosses and just act as teachers or instructors. For we should aim to teach workers that they are not individuals, not unrelated atoms in a random universe. Teach them that they live in a world of law—of evolution by law—that they are links, every one of them, in their work, in a splendid chain that has been running since life began and will run to the end of time.

No mistake on the part of the worker, no matter how trifling, should go unnoticed. Rather, the worker should be shown the cost of his mistake and instructed how to do it correctly next time. If this is not done the worker would go on making the same error until he had learned by accident to do it right, which in many cases would be long and costly.

It is well to encourage suggestions, and all suggestions should be received in a cordial manner, and in every case care should be used to explain the value of the idea and if of no value equal consideration should be given by explaining why the suggestion is not workable; this will leave the worker more anxious than before to think up some good idea and even if he never hits upon an idea of value to the company, the fact that he is attempting to think will do him some good.

About the best signs I have noticed on the walls of a manufacturing plant were a number of signs with just one word—THINK.

It is good to take at least a little interest in his outside affairs. Many times a good superintendent can help by giving a little advice regarding various matters that come into their lives, such as sickness, investments, home building, bad debts, and in case that they are foreigners, help them to become citizens. etc. This would cause the workers to have a more kindly feeling towards their superintendent and to the work in general. According to Sir Walter Scott: "The race of mankind would perish did they cease to aid each other. We cannot exist without mutual help. All, therefore, that need aid have a right to ask it from their fellow men; and no one who has the power of granting can refuse it without guilt."

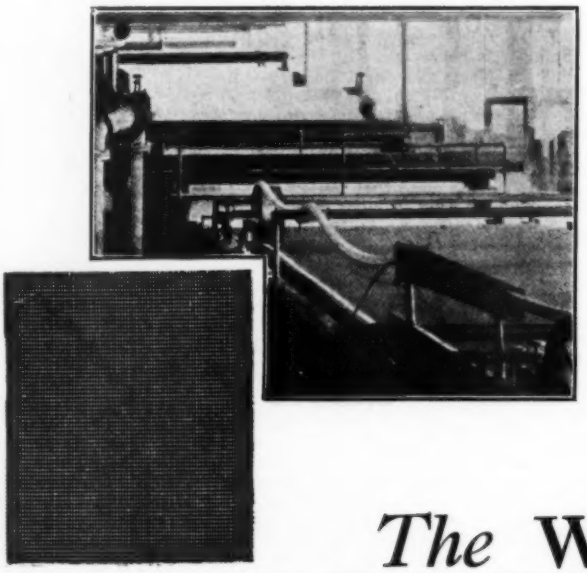
These facts as read, if always carried out and applied, will naturally bring about close harmony between superintendents and workers, which, after all, is the most vital in successfully operating mills. The essential point is not to forget the spirit while watching the wheels of the machine go round.

*Address before the Michigan division of the Superintendents' Association, Kalamazoo, Michigan, April 24, 1924.

M. B. Hall, of sales department of the corrugated division of the American Boxboard Company, manufacturers. of Grand Rapids, Mich., has just returned from an extended pleasure trip in California.

He reports that the paper trade on the western coast is similar to most other sections of the country; that is, quiet.

Smooth Fourdrinier Wire—



Of an even mesh, that does not groove the Suction Boxes and runs "smooth as silk" over them. No seams have to be cut, no Suction Boxes have to be planed, and you are assured of long life and increased production with CABBLE SUPERIOR FOURDRINIER WIRES.

Made of the highest quality brass or phosphor bronze, every length is tested before leaving our factory. Seams made to suit your individual requirements.

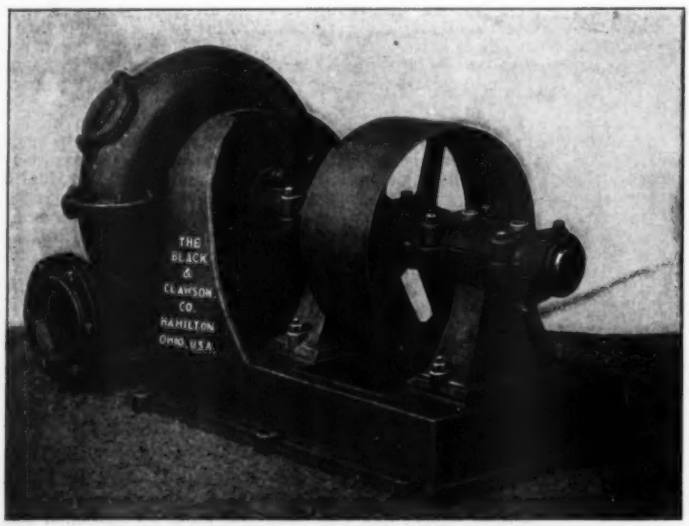
Let us fill your next order and show you what prompt service and fine quality we can give you.

The WM. CABBLE
EXCELSIOR WIRE MFG. CO.
80-88 AINSLIE ST. BROOKLYN

The BLACK-CLAWSON CO.

Leading Builders of Paper and Pulp Mill Machinery

Hamilton, Ohio, U. S. A.



Fan Pumps of Iron or Bronze in Sizes from 2" to 12".

ESTABLISHED 1873, and since we have steadily grown and stood forth as leaders in the manufacture of paper making machines and other equipment for every requirement in Board, Pulp and Paper Mills.

Our large plant and special equipment with skilled and trained help enable us to render efficient and prompt service and satisfaction to a customer.

The best is none too good. Let us serve you.

Michigan News

May 1, 1924.

Many Improvements at Bryant

A record in papermill construction and reclamation in the Kalamazoo Valley district was established when Monday night, March 31, shortly before midnight, the big Fourdinier machine in the Superior Division of the Bryant Paper Co. resumed operation after a shutdown of but three months and one day.

In the period intervening since Sunday, December 30, this unit of the giant industry, declared personally by President Felix Pagenstecher to have deteriorated to an old type mill, has been restored to a modern plant of the most approved efficiency and capable of operation in the future at a satisfactory profit.

The work accomplished was for the time required monumental. It include the erection of a new conversion plant from the ground up, the rebuilding of the machine room and beater room, erection of new piers and foundations in the basement, demolition of the old powerhouse and the removal of steam engines, line shafting and antiquated drives for paper machines and auxiliary machinery, also the removal of an immense amount of equipment that has become useless by the adoption of the new order of things.

All that remains to be done is to finish painting the interior of the structure and completion of numerous small odd jobs, none of which will in anyway interfere with the operation of the plant. It is now a certainty that next week the second and smaller machine in the mill, a Harper Fourdinier, will be running in unison with its larger companion.

The immense amount of steel, concrete and masonry construction required by this program was handled by Ray D. Boyer, of this city. He pushed his men to the limit and was able to keep up with the requirements outlined by Engineer Simons, Chicago, and Assistant Frank Gilligan.

The most notable feature of the work accomplished is the new conversion plant, housed in a reinforced concrete and steel building, three stories high and 160 by 47 feet in dimensions. It embodies features never before seen in the Kalamazoo Valley, in which a high grade pulp is manufactured from waste papers, book and writing stock being used exclusively.

The sorting room is on the third floor, a light, airy comfortable apartment, where working conditions are ideal. It is directly connected to the stock house. The sorted stock is fed by traveling carrier into the shredder and then dumped automatically in a huge beater on the second floor, from which in turn it drops into mammoth ten-ton cooking vats in the basement. By pump, it is then carried back to the second floor and to the riffle boards of the washing machine. Grimy at first, it passes through three waters and is pumped through an auxiliary washer for the final operation before going straight to the beaters, Jordans and paper machines in turn.

By this system the former battery of rotary boilers, cookers, bleach vats and small washers is entirely eliminated, two men handling the work that was formerly done by 25 or 30, while the task is much easier and more inviting. There is at the same time an enormous annual saving in power costs.

This single conversion plant operating 24 hours a day has sufficient capacity to supply not only the needs of the Superior machines for stock, but in addition the five machines in the Bryant division, thus eliminating in that unit three sorting rooms and a vast amount of auxiliary machinery and equipment that will in a short time be thrown into the discard. By a very simple device the washed stock is pumped from the storage vats in the Superior mill through a ten-inch wooden pipe underground to the beaters, supplying machines one and two in the Bryant unit, and will later similarly care for the needs of machines 3, 4 and 5.

Another step in this improvement campaign has been the alterations to the beater and machine rooms. Both these apartments are completely made over. The roof of the beater room has been raised and a long lighting cupola added. Washers have been thrown out and beaters reassembled so they can be driven efficiently by motors. In the machine room large windows have been put in at each end and former windows on the sides, making this apartment light and airy. New concrete floors have been laid and all old lineshaft drives have been replaced by motors.

The old boiler house has been wrecked and boilers and engines scrapped. Power for the Superior is furnished from the new central power plant, the steam passing through an immense pipe carried on steel towers. This pipe is insulated with three inches thickness of asbestos and is guaranteed to be impervious to outer cold.

Improvements in the basement include the erection of new concrete piers and foundations and huge stock chests of concrete for the storage of manufactured pulp. All the old basement machinery is being eliminated. The interior finish is in a white and grey enamel.

"We are glad to resume operations in the Superior Division," said Mr. Pagenstecher, "thus getting some income in place of all outflow. It is our intentions to operate this unit as a specialty mill, it being adapted for that purpose. We will look to the other divisions for quantity production.

"Our Superior, Milham and Imperial divisions are now in splendid condition, but the old Bryant division needs attention and will be the next to be improved and brought right up to date. That work will start immediately and pushed as rapidly as possible.

"The aim is not only to increase production, but quality of our output as well. At the same time costs are being carefully considered. We will effect an immense saving in power and labor through our new conversion plant. It is becoming more and more difficult for the American manufacturer to secure common labor, therefore he must rely on automatic machinery. particularly is that true if he is to successfully meet foreign competition. Second generation of Americans are no longer satisfied to be classed as common labor. That also has to be considered. The growing demand for workers covers every field of activity. There is no longer an abundance of cheap help in any industry."

Michigan Mills Protest Freight Rates on Coal

Paper mills throughout Michigan, in joint effort with other big coal consuming industries, have filed complaint with the Interstate Commerce Commission against what is considered a discriminatory freight rate on coal from West Virginia and Kentucky fields. The rate is approximately twenty-five cents higher than other points requiring the same hauling distance, it is said.

If successful results come from the complaint, it is estimated that more than $1,000,000 will be saved annually by the larger coal consuming industries in Western Michigan, the paper mills being among the biggest users.

The complaint is filed against the Chesapeake & Ohio Railway Company, and others, constituting about fifty-six different roads.

Western Michigan industries have contended for several years that the rate which is based on traffic through Toledo is a discrimination. Several cases were brought some years ago. Mine operators also filed complaints in an effort to help their Michigan customers, but as a result of failure of the interested parties sticking together and prosecuting their complaint, only a few cents reduction was gained at that time. There is a more thoroughly organized effort now being pushed, however, and it is announced a hearing will be given the complaint in the United States District Court at Grand Rapids May 19.

Kalamazoo Man Made a Vice-Pres. of A. P. P. A.

Alexander Gilman, president of the Allied Paper Mills, Kalamazoo, Mich., was elected a vice-president of the American Pulp and Paper Association at its annual convention in New York City in April.

The Michigan manufacturer drove home some pertinent points at the meeting, among which he said:

"Many paper and pulp importers are no better than the bootleggers of rum row, so flagrant are their violations of the customs laws," in his war-cry on unfair competition in the industry.

"It must be stated, however," he continued, "that most importers have been careful to conduct their foreign business in accordance to the letter of the law—that must be truthfully conceded. A small minority, devoting every effort to swindle the government by evasion of the law to the detriment of the honest majority, is what we must fight; that minority being chiefly importers who purchase abroad cheaply made paper and pulp of inferior quality, get it into this country through evasion of the custom laws and undersell American-made products. That's the kind of stuff we've got to fight and fight hard."

"The industry has the whole-hearted co-operation of we Michigan manufacturers," concluded Vice-President Gilman.

Hawthorne Paper Gets Valuable Technical Man

Fred C. Clark, for 22 years connected with the paper industry and one of the best known and most highly respected men in the trade, has been added to the organization of the Hawthorne Paper Company of this city and has taken up his duties, cooperating with A. H. Dwight, president, and Robert

The Sandy Hill Iron & Brass Works

Hudson Falls
New York

Manufacturers of **Paper and Pulp Mill Machinery**

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*
Brass, Copper and Iron Cloth
Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works
Established 1842 SPRINGFIELD, MASS.

L. Pease, vice-president and general manager, in the conduct of the business.

After being graduated from college, Mr. Clark was for nine years engaged in working in paper mills, getting first hand knowledge of the industry through his daily work. The next eight years he was employed in the paper section, Bureau of Standards, Washington, D. C. From there he went to the American Writing Mills, Holyoke, being in charge of the technical department. His next step was to the post of vice-president and general manager of the Pejepscott Paper Company, Brunswick, Maine. He was there two years when he was induced to come to the Hawthorne Paper Co.

"We consider ourselves very fortunate to obtain Mr. Clark's services," said President Dwight. "He is one of the best technical men in the paper industry today. I say that without fear of contradiction. He intends to make Kalamazoo his home and will move here as soon as he can find a suitable residence. Mrs. Clark is at present in Brunswick."

Paper Interests Join Others in Wood Problems

Problems affecting the paper-making industry and other big wood-using fields, were thoroughly discussed at a meeting in Washington on April 22, at the Division of Simplified Practice, Department of Commerce, which was attended by many Grand Rapids and Western Michigan paper manufacturers and distributors.

Organizations which took an active part in the conference, other than those of the paper industry, were the National Alliance of Furniture Manufacturers' Associations, the National Commercial Fixtures Manufacturers' Association, and the Refrigerator Manufacturers' Association, all having headquarters in Grand Rapids; and, the Michigan Hardwood Manufacturers' Asociation of Cadillac, Mich., the Michigan Retail Lumber Dealers' Association of Lansing, Mich., the Detroit Lumber Dealers' Association. They all, of course, have a common problem—the wood problem—and the importance of studying that problem toward a more rigid attitude concerning conservation and simplification methods, is emphasized by the consolidated, co-operative and unified effort of these organizations.

April Meeting of Michigan Superintendents

The regular monthly meeting of the Superintendents' Association took place on Thursday evening, April 24th. Mr. N. M. Bribois, superintendent of the Sutherland Paper Co., gave a speech on: "Harmony Between Superintendent and Workers" (this speech is printed on another page of this issue), after which there was a round table discussion of superintendents' problems.

Among those present were: E. H. Gilman, Bryant Paper Co.; Alfred Bryant, Bryant Paper Co.; Jacob Parent, Western Board & Paper Co.; Victor Troyer, Constantine Board & Paper Co.; A. G. Whigtman, Hawthorne Paper Co.; Wm. Whightman, Hawthorne Paper Co.; C. A. Harter, Rex Paper Co.; N. M. Brisbois, Sutherland Paper Co.; Mike Redmond, Kalamazoo Paper Co.; Clarence Thorne, Watervliet Paper Co.; Frank Johnson Allied Paper Mills; Jacob Kuss, Allied Paper Mills; J. Scharr, Goodyear Rubber Co.; George H. Pountain, Allied Mills; Wm. Sievert, Michigan Carton Co.; Alex McVie.

Murray Buys Kalamazoo Label Co.

Richard E. Somers and Anna B. Somers, for the past six years respectively secretary and vice-president of the Kalamazoo Label Company, have sold their combined interests in that concern to James J. Murray and at the same time retiring.

Mr. Murray has assumed the duties formerly handled by Mr. Somers. He is well known in the paper industry, having for 15 years been associated with the Kalamazoo Stationery Company and allied institutions, advancing to the position of general sales manager of the parent organization. He resigned that post a few weeks ago to engage in business more directly for himself.

W. E. McGuire will continue as president of the Kalamazoo Label Company and A. C. McGuire as treasurer. The former announces that a meeting of the directors will be held in the immediate future to effect reorganization.

Hopkins Comes to Valley Paper Co.

B. M. Hopkins, Jr., has joined the force of the Valley Paper Company and will devote his time to selling stock in the new concern and assisting in the general organization that will result in the addition of another paper industry to the long list now in Kalamazoo. Mr. Hopkins has for several months been with the William L. Ross and Co., Chicago bond house. He has worked in and around Kalamazoo and is well known here. He is a member of the Park Club and the Kalamazoo Country Club and enjoys favorable acquaintance with a steadily increasing coterie of business men.

He is attracted to the Valley Paper Company as a concern which will be speedily financed if the proposed stock sale campaign is properly handled. He considers that conditions are just right in Kalamazoo for the establishment of the new industry here.

Elected President of Grand Rapids Rotary Club

William A. Jack, general manager of the American Boxboard Company of Grand Rapids, Mich., was elected president of the Grand Rapids Rotary Club, April 29, at the club's annual election of officers. Besides his duties as general manager of the big paper plant, Mr. Jack figures prominently among a number of other industrial enterprises of his city, being listed on the directors' roll of several of them. He also plays a large role in the city's social and philanthropic life, having a short time ago contributed a $50,000 church organ to the Fountain Street Baptist Church, and in connection with that gift he donated an annual fund not to exceed $5,000 to be used as the organist's salary, the fund to continue over a period of ten years.

Paper Salesmen at Travelers' Protective Meet

The annual Michigan convention of the Travelers' Protective Association was held April 26, in the Pantlind Hotel at Grand Rapids. About 200 delegates attended, coming from Kalamazoo, Muskegon, Battle Creek, Jackson and Detroit, among whom was a nice representative group of salesmen from the various paper mills and distributors throughout the state. The annual election of officers was held with Clyde E. Brown, state president, in charge.

Preparations were made for the national convention which will be held the first week in June, at Grand Rapids, when paper salesmen from all producing centers of the country will be present.

Heavy Floodwaters Damage Paper Mills

On April 25 the heavy spring floodwaters in the Escanaba River in the Upper Peninsula of Michigan, running through the city of Escanaba where there is a co-operatively owned paper mill power canal, tore a fifty-foot gap out of the canal bank. Damages suffered by the mills, other than that done to the canal were slight, officials announce. Work is being forced rapidly by a crew in an effort to build an emergency cofferdam so that mill operations may be resumed as soon as possible pending the reconstruction of an up-to-date dam.

The Parchment Community house was thrown open to the Loyal League and Philadora Clubs of the Y. W. C. A. on Tuesday, April the 29th. After the dinner R. O. Brundage, assistant to Mr. Kindleberger, and Rev. O. R. Gratton showed the girls through the mill. The program, which included Scotch songs by Phineas Wheat, son of the late A. A. Wheat of Petoskey, and several piano numbers by Edward Makin, was enjoyed by all.

Dr. Fleischer, who was in charge of the research of the Bryant Paper Co., has resigned his position with that company. Dr. Fleischer came here from England, where he had a position with an English paper firm. He is a German, coming originally from Affenschaaftenburg, where he had charge of the research department of the largest paper mill in southern Germany.

The Kuhlman Electric Company of Bay City, Michigan, manufacturers of Power, Power Distribution and Street Lighting Transformers, have opened a Sales Office at 300 Madison Avenue, in charge of Mr. D. F. Potter, Jr., New York Manager.

The next meeting of the Superintendents' Association will be held on May 15 to talk over the convention. No outside speaker has been arranged for and the meeting will not be preceded by the usual dinner.

Mr. A. L. Marshall, for a great number of years Service Manager of the Industrial Works, Bay City, Michigan, is now connected with their Chicago office, 1051 McCormick Bldg., as Sales Engineer.

The Menominee and Marinette Paper Company, Menominee, announces plans to erect a $200,000 addition to its plant.

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

CANTON, MASS.

Woolen Manufacturers Since 1856

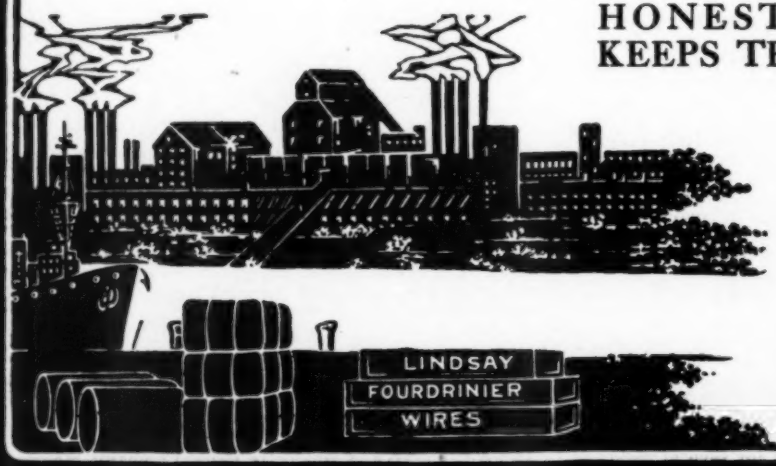
REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich. INTERNATIONAL TRADING CO., Philadelphia, Pa.

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills



HONEST SERVICE
KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

Ohio News

May 1, 1924.

Shartle Builds New Addition

Constructing an addition to their plant that will make their capacity four times what it was in 1907, the Shartle Brothers Machine Company, manufacturers of paper mill machinery, has added to the industrial growth of Middletown.

The addition means that the floor space of the present plant has been doubled and that production will soon be doubled.

Prior to 1907 the work done by the Shartle Brothers' Machine Shop consisted chiefly of repairing machines for local paper mills. Their production of the "Shartle Stuff Pump" began in 1903 and has since expanded until they now build more of these pumps than any manufacturer in the country.

With the new addition it will now be possible for the firm to manufacture all machinery used in paper mills. An increase of 50 employes will be made, making a total of two hundred employed. In 1885 the force consisted of seven, including office employes.

C. W. Shartle, president of the concern, came to Middletown from Philadelphia, where he served as machinist apprentice and in a foundry, to take charge of the Middletown Machine Company for Captain Wilson. In 1885 he left Wilson's employ, and founded the Shartle Brothers' Machine Company, with his brothers Dan, Frank, and Bob. Their plant was located in a livery stable back of Worcester's livery stable and at that time employed 15 men. Henry Pippert, now shop superintendent, Arthur Hansel, Arthur Schneider, Homer Martindale, secretary-treasurer, and Adam Bridge, sales manager, are the original Shartle Brothers' men still connected with the industry.

The original engine in the livery stable plant was 15 horsepower Misemi gas engine; the one just installed in the addition is a 350 horsepower Diesel oil burning engine.

In 1914 the manufacture of new machinery was begun on a larger scale, although between 1907 and that year a number of standard paper mill machines were constructed.

C. W. Shartle, who is rated an expert mechanic and paper maker, has invented several paper making machines that have proved important to the industry. His stuff pump is one of these which has proved very popular and his breaker beater for board mills has revolutionized the beating of stock used in these mills. While formerly a beater produced 20 tons of pulp in twenty-four hours, Shartle's beater produces 500 tons in the same amount of time. Having been on the market ten years, this beater is used in 40 leading board mills.

J. W. Hamm, who was formerly employed by the Beloit Iron Works of Beloit, Wisconsin, has been added to the concern as machine designer.

Champion Coated Merges with N. C. Concern

The Champion Coated Paper Company, of Hamilton, has bought the controlling interests in the Champion Fibre Company, located in Canton, North Carolina, and the executive offices of the company will be moved from Cincinnati to Hamilton and merged with the Champion offices, it has been announced by Walter D. Randall, vice-president of the Hamilton concern.

Peter G. Thomson, Jr., has disposed of his holdings in the Fibre Company and has retired from presidency of the concern. It is understood that an entire new board of directors will be chosen for the Fibre Company. Reuben Robertson, who has been manager of the Fibre Company since the factory was built, will remain in the same position according to present plans.

The purchase of Peter G. Thomson's interests gives the Champion Coated Paper Company complete control of both interests. The Champion Fibre Company is capitalized at $2,000,000 preferred stock and $1,000,000 in common stock.

Miami's Monthly Superintendents' Meeting

Thirty members of the Miami Valley Division of Pulp and Paper Mill Superintendents' Association met in their regular meeting at the Hotel Manchester, Middletown, Saturday night, April 26. Two papers written by Peter J. Massey were read in the absence of Massey who was scheduled to address the meeting.

E. T. Coughlin, vice-president of the national association, was present and related the organization of a new division in the south.

The Executive committee of the Miami Valley Division was instructed to support Coughlin for president at the Dayton convention, May 22, 23 and 24.

Those who attended the meeting were:

A. J. Allison, A. A. Simonds Company, Dayton; M. V. Brooks, Miamisburg Paper Co., Miamisburg; Wm. T. Schenck, Black Clawson Co., Hamilton; C. A. Kelly, Champion Coated Paper Co., Hamilton; Frank R. Henry, A. A. Simonds Co., Dayton; George Harvey, Gardner-Harvey Co., Middletown; Roy W. Maggart, Champion Coated Paper Co., Hamilton; B. M. Bishop, Gardner-Harvey Co., Middletown; T. H. Keogh, Dayton; E. W. Keogh, Dayton; C. A. Miller, Miami Paper Co., West Carrollton; R. L. Eminger, Miami Paper Co., West Carrollton; J. L. Meece, Gardner-Harvey Co., Middletown; Jack Smith, Sr., Gardner-Harvey Co., Middletown; H. W. Server, Miami Paper Co., West Carrollton; H. D. Martindale, Shartle Brothers, Middletown; G. S. Martindale, Champion Coated Paper Co., Hamilton; L. T. Murphy, Auglaize Box Board Co.; N. J. Niks, Chillicothe Paper Co.; F. A. Karls, Champion Coated Paper Co., Hamilton; Homer C. Ferguson, Champion Coated Paper Co., Hamilton; Charles Soule, Champion Coated Paper Co., Hamilton; J. Adam Ritz, Ohio Paper Co., Miamisburg.

Franklin Concern to Build Georgia Plant

Construction of a modern asphalt roofing plant at Atlanta, Georgia, as large as the one it operates in Franklin, was announced during the month by James W. Quigley, vice-president and production manager of the company which produces Tu-El roofing products.

The Logan-Long Company holds an option on a seven and one-half acre tract in Atlanta, in a desirable part of the city and on this site the modern mill will be erected. To supply the company's growing southern trade is the object of building the Atlanta plant, Mr. Quigley said. The new plant, however, will in no way affect production at the Franklin unit. The southern plant will manufacture the same products but production will be enhanced by up-to-date machinery and equipment.

Since its organization the Logan-Long Company has had phenomenal success in the asphalt roofing field. This company has been manufacturing Tu-El products since November, 1922. The Franklin plant was taken over from the Beaver Board Company after a disastrous fire had caused heavy damage to the mills. During the sixteen months of operation the company's business has grown steadily and production the first year was 800,000 rolls of roofing.

The old Eagle paper mill on Sixth street, Franklin, Ohio, which was formerly one of the village's important industrial centers, operated for several years past as a tobacco warehouse by W. T. Estes, has been sold to the Sol and Harry B. Slavin Company of Dayton. The company will engage in the rag and paper sorting business.

The Lawrence Bag Company, of Miami, has purchased part of the factory of the Miami Cabinet Company and will move to Middletown. The purchase price of the new factory was reported at $40,000. James F. Lawrence is president of the concern which employed thirty people at its Miamisburg works.

The Sealtite Envelope Company has been incorporated for $50,000 by Tom Woodward and H. D. Hughes, of Middletown. Location of the plant for the manufacture of the patented brand of envelopes has not been announced.

Frank Smith, president of the new Frank Smith paper mill, has purchased his second airplane from the Johnson Airplane Supply Company of Dayton.

Fibre Board Successfully Made from Hardwood

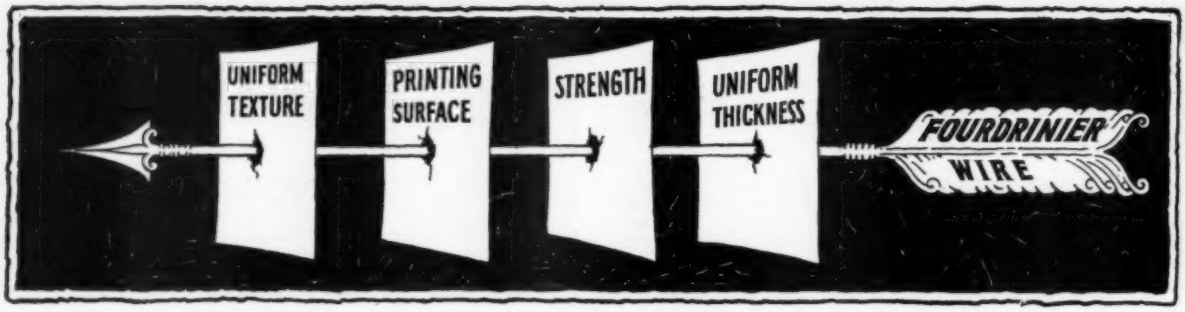
The Ford Motor Company reports, after a long period of experimentation, its success in making a good grade of fibre board from the hardwood scrap lumber refuse from the body-building plants at River Rouge.

It is the first time in the history of papermaking, according to the Ford Company officials, that hardwood has been successfully converted into pulp suitable for the manufacture of paper.

Scrap lumber goes into a chipping machine, is then carried by suction pipes to an ordinary papermill digester in which a special caustic solution reduces the chips to a high quality pulp.

When the digesting process is finished, the pulp is cooked under 110 pounds steam pressure for seven hours, after which it is pumped into washing machines and thoroughly cleansed.

Then comes the roller process, from which it is claimed, emerges 100 per cent good fibre. The company is planning to manufacture all paper cartons it uses for shipping purposes.



CLEAR THROUGH!

The results of every test to determine the quality of paper can be traced back to the quality of the Fourdrinier Wire used.

The formation of the sheet of pulp on the Fourdrinier Wire is the most important step in the paper-making process.

If the meshes of the wire are not uniform, the water cannot be uniformly removed—if the wire does not lay flat and smooth, the sheet will vary as to thickness—if wrinkles or enlarged meshes occur, wire marks will appear in the paper—if the edges of the wire become slack, the paper will have a feathery edge.

To produce high test paper, a high quality Fourdrinier Wire must be used.

Tyler Fourdrinier Wires are woven by weavers skilled in the art, and on looms especially designed and built by The W. S. Tyler Company.

The firm weaving and accurate mesh of Tyler Fourdrinier Wires, combined with their ability to run straight and true, insure the quality of paper from the standpoint of the Fourdrinier Wire.

Woven in all widths up to and including 250 inches.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

TYLER FOURDRINIER WIRES

Holyoke Machine Co., Holyoke, Mass.

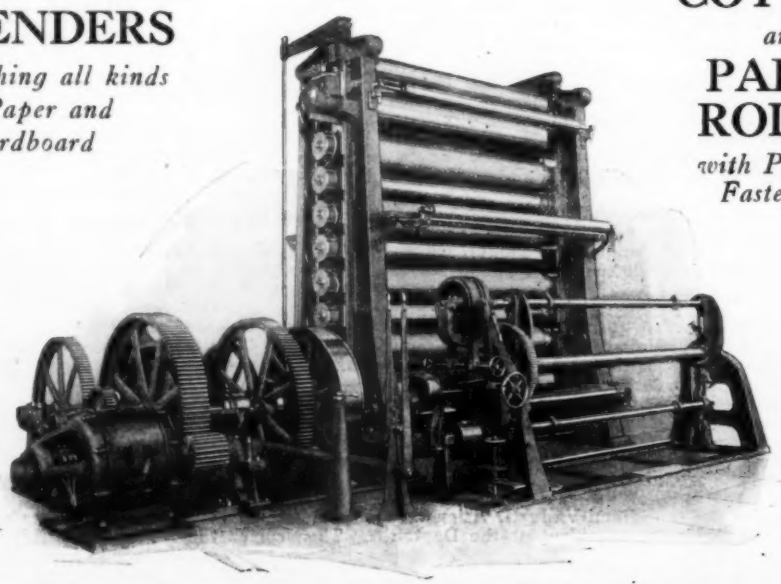
Makers of Improved Machinery for Wood Pulp and Paper Mills

LARGEST MAKERS *of*

CALENDERS

for finishing all kinds of Paper and Cardboard

COTTON *and* **PAPER ROLLS** *with Patented Fastenings*



Platers,
Washing and Beating Engines,
Wood Pulp Grinders,
Barkers,
Chippers,
Rag and Paper Dusters,

Rag Cutters,
Hydraulic Pumps and Presses,
Hercules Water Wheels and Governors

Canadian Section

Montreal, May 1, 1924.

Prime Minister Opened "Save the Forest Week"

April 27 to May 3 was "Save the Forest Week" in Canada. It was officially opened by the Right Honorable W. L. Mackenzie-King, prime minister, who issued an appeal to all Canadians to co-operate to prevent forest fires.

It points out that "the loss of national wealth through forest fires must inevitably be reflected in the burden on the tax payer. Our forest industries, next to agriculture, constitute the most important source of our national income. We in Canada to-day do not appreciate the extent to which our prosperity is dependent on a stable supply of raw materials for these industries. The Government is aiming at reduction of taxation. There is no way in which the people of Canada can more effectively assist in achieving this result than by united effort to stop the present tremendous losses through forest fires.

"Our own interest as well as our duty to those who come after us demands that we avoid carelessness and neglect of reasonable precautions, which has been the cause of over ninety percent of our forest fires in the past. For these and many other reasons I endorse sincerely and wholeheartedly the present forest fire prevention campaign."

The Canadian National Railways placed at the disposal of the forestry associations all their radio broadcasting facilities during the "Save the Forest Week." The programme comprised broadcasting of addresses by the Hon. Chas. Stewart, Hon. C. M. Hamilton, Sir Lomer Gouin, W. H. Kilby, C. Price-Green, C. H. Morse, Dr. Walter Murray, J. W. Dafoe, Archibald Mitchell, Hon. George Hoadley, and Clyde Leavitt.

Price Bros. Shows Large Gain in Profits

The annual report of Price Bros. & Co., Ltd., for the fiscal year ended February 29th, 1924, shows a large gain in earnings over the previous year, showing slightly over $4 per share on the common stock against the $2 distributed. After doubling the depreciation reserve, the total surplus was more than doubled at $1,568,318. While its working capital position is well maintained there is a decided preponderance of inventory in the company's current assets.

One of the most interesting features of the report is the confirmation that no curtailment of the company's expansion programme is contemplated. In this connection Sir William Price in his remarks to shareholders states: "The extension to the company's Kenogami mill is nearing completion. The plans for the second mill are practically completed and construction will be commenced this spring. The choice of location of the third mill is practically decided upon, and a certain amount of preparatory work has already been done. After a careful study of the company's wood resources, your directors are of the opinion that a fourth mill will be required to be built."

When asked about reports that the head office of Price Brothers was to be moved from Quebec to Montreal, Sir William Price stated that what must have given rise to that report is that the company is now considering the advisability of removing its head office, not to Montreal, but to Kenogami. This would not mean closing down of the Quebec office, and another office might also be opened in Montreal to handle certain business. Nothing has been definitely decided as yet.

Government Takes Over Grand Falls Mill

The Grand Falls on the St. John River, in New Brunswick near the Maine boundary, formerly held by the International Paper Co., has been taken over by the New Brunswick Government which plans to install a plant to develop a large amount of hydro-electric energy. The location was formerly under lease to the paper company; but the lease was cancelled on the ground that it did not comply with the conditions concerning the power development.

The matter is now being aired in the press by P. J. Veniot, prime minister of New Brunswick, who is publishing letters exchanged on the subject between himself and P. T. Dodge, president of the International Paper Co. He states that in one of his letters the president of the International Paper Co. wrote in part: "There are reasons why the provincial governmetn could not make the development in the face of opposition from us without international complications. There will be no opposition on our part to the transfer of the properties to the province or its development by the province unless we are treated unfairly." It is practically assured that International Paper will file a claim because of the loss of the Grand Falls rights; and as it is expected that the province will have to take over some property leased to the company in proceeding with the development, the company will also seek compensation for such transfers.

Rumor of Drop in Newsprint Groundless

Rumors which were recently circulated to the effect that a break was imminent in the newsprint market and that a cut of five dollars a ton would be in effect by June 1st at the latest, are pretty clearly ear-marked as bear propaganda. According to Edward Beck, secretary of the Canadian Pulp and Paper Association, there is absolutely nothing in the newsprint situation either here or in the United States (which absorb over 85 percent of the Canadian output) to support such statements.

M. B. Wallace, referring to these rumors at the annual meeting of the St. Maurice Paper Co. of which he is president, stated that at present there is a little over-production, but that some mills have curtailed their production, and it looks as though on May 1st there will be some shut downs by reason of the fact that some companies have decided to try this year to eliminate union labor from their mills. Such shut-downs would naturally take care of what little over-production exists at the present time.

In view of the fact that newsprint consumption is always measurably greater during presidential election years, there is good reason for hoping that the $75 per ton rate will obtain throughout the year.

Brown Corp. Plan Extensive Enlargements

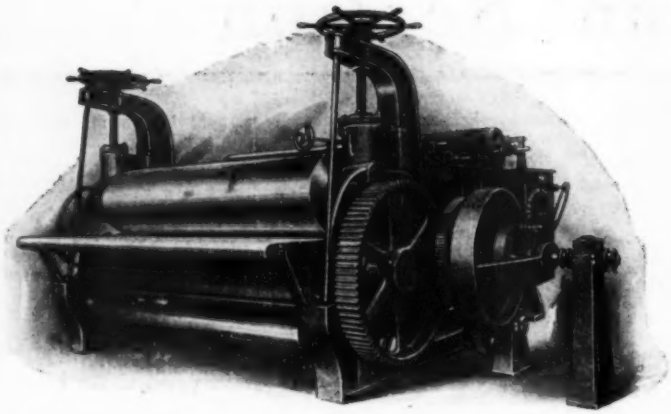
The Brown Corporation is planning enlargements of its Canadian property at La Tuque, P. Q., that will enable a broad range of by-products to be manufactured. In the United States the parent corporation has taken the lead among the pulp and paper companies in utilizing materials that at the present time are wasted in most pulp and paper mills. Some of the methods and processes which have been worked out in the American laboratories will be applied in the Canadian mill. At the present time it is manufacturing turpentine and sulphate pulp at La Tuque.

With the addition of further equipment it will be possible to manufacture chloroform and industrial alcohol from the waste liquor. An interesting article now being turned out by the company's mills in the United States, and likely to be produced in Canada, is fiber tubing that is to some extent replacing cast iron, copper and other metal piping in mines and in underground work as electrical conduits. It is made by pressed groundwork, mixed with waste liquor and tar, and provides a material having both insulating and waterproof properties. It is understood that the Brown Co. recently received a $7,500,000 order for tubing from the General Electric Co.

Transactions Questioned by St. Maurice

For some time past it has been the fairly general opinion of the Canadian minority shareholders of St. Maurice Paper Co. that this company was being "milked" by Union Bag and Paper Co., of which it is a subsidiary and which holds a controlling amount of the stock. At the annual meeting held in Montreal on the 15th of April, Frank P. Jones, president and general manager of the Canada Cement Co. put some very plain and pointed questions to President M. B. Wallace, who replied in an equally clear and direct manner and succeeded in completely dispelling any fears on the part of the Canadian investors.

The most important point raised was that of the deal through which last year St. Maurice Paper acquired certain timber lands from Union Bag and Paper, and President Wallace explained that in this case St. Maurice had made a good



Wet Machines

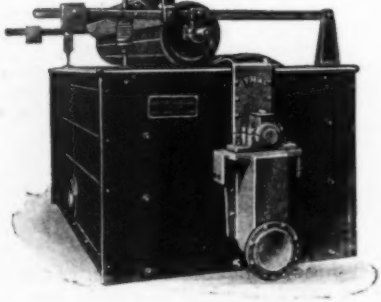
WET MACHINES are made to meet customers' specifications.

The illustration shows our Standard machine having Iron top and bottom press rolls, iron felt rolls and steel Vat.

Built in sizes to take Cylinder Moulds up to 40″ diameter and 96″ wide.

Cylinder Moulds

WE make CYLINDER MOULDS in sizes up to 60″ diameter and 160″ long. We have provided special equipment which insures accuracy, rigidity and strength—when covered with cloth, the same is hand sewn.



Deckers

THE HYMAC DECKER is built in sizes carrying cylinder moulds up to 48″ diameter, 132″ long. Larger or smaller sizes may be had to suit the purchaser. We provide wood or all metal vats. The illustration shows a wood vat. The metal vat is built with rounded bottom unless otherwise specified.

THE HYDRAULIC MACHINERY CO., LIMITED

MONTREAL, QUE.

Canadian Section

transaction and had secured the limits at a price appreciably below that which other companies would have been glad to pay for the lands, and that in view of the fact that the administration had acted more or less in a dual capacity on this occasion particular care had been taken to act fairly towards the minority shareholders. The president's frank and clear explanations created a very favorable impression.

U. S. Paper Manufacturers File Embargo Protest

A memorandum on behalf of the pulp and paper manufacturers of the United States, summarizing the arguments against the proposed imposition of an embargo on pulpwood exported to the United States, has been filed with the Royal Commission which has been investigating the whole question of an embargo and which is now completing its report for presentation to the Government. Going at some length into statistics as regards exports, the memorandum states that the proposed embargo would affect only 1.7 percent of the total lumber cut, if farmers' and settlers' lands were exempted from the embargo, as provided for by an order-in-council passed last year.

Furthermore, considering the fact that this order-in-council exempts from the operation of any embargo all contracts given prior to June 15, 1923, for a period of 10 years, the actual percentage of the total wood cut that any embargo would apply to would actually be one percent, or less than one percent, of the total cut, or somewhere between 100,000 and 150,000 cords per year. One is inclined to wonder "why so much fuss for such a small item?" Is it a case of "Much Ado About Nothing?"

Eddy's Assessment Problem to Be Soon Settled

Initial steps which are likely to lead at an early date to the settlement of the fixation of the E. B. Eddy Company's assessment were taken at a special meeting of the city council of Hull, P. Q. Faced with a definite request from the E. B. Eddy Co., Ltd., asking for a commutation of taxes on all their Hull properties for a period of 10 years from May 1, 1922, with the assurance that improvements costing in the neighborhood of $1,000,000 would be undertaken at once if the request were granted, the city council took decisive action.

A resolution embodying a counter proposal, and unanimously adopted, proposed that the council would submit to the Hull taxpayers a by-law calling for a commutation of taxes to the Eddy Co. on an assessment of $4,000,000 for all its properties for a period of 10 years from May 1, 1922. The by-laws is to be submitted as soon as possible, and if it carries the company is to undertake its new building program as soon as possible. In the event of the by-law being defeated, the cases now pending must be referred at once to the courts. Should the by-law carry, each party is to pay its cost in the cases now pending.

Claridge and Pulling Quit U. of N. B.

Considerable mystery surrounds the resignation of the faculty of the forestry school attached to the University of New Brunswick. Professor B. E. Claridge was the first to announce his intention to quit the school. His resignation was quickly followed by that of his superior, Professor V. P. E. Pulling.

In some quarters it is held that the proposed embargo and the sentiment in its favor prevailing in certain portions of the country, and particularly around the University of New Brunswick, is responsible for the resignations, as both men come from the United States. Professor Pulling, who is a graduate of the New York State School of Forestry at Syracuse, will return to that institution as a member of the teaching staff. Professor Claridge, who is a graduate of the Yale School of Forestry at New Haven, will go to the Hammermill Paper Co. of Pennsylvania as a forester on the company's property along the Gaspé coast. He will be established at Matane near the provincial boundary between Quebec and New Brunswick.

Wilson Pleads for Forest Protection

At a luncheon of the Rotary Club, on the 22nd of April, Ellwood Wilson, manager of the forestry department of the Laurentide Co., made an exceptionally strong plea for forest protection. About eighty-five to ninety percent of Canadian forests are owned by the Canadian people, and it is up to them to see that they are properly protected to ensure a permanent supply of wood, by sending to Parliament men who will take an interest in the matter.

In order to emphasize the gravity of the situation, which is realized by very few people, Mr. Wilson said that it took seventy to eighty years to grow a stick of lumber fit for good pulpwood, and upwards of a century for it to grow to a size suitable for sawlog purposes. He and a group of foresters who had inspected the whole forest resources of the province of Quebec, both by land and by airplane, recently had jointly tried to estimate how long the provincial forests would last at present rates of consumption, provided they were not destroyed by fires and insect and fungous pests, and their joint conclusion had placed the period at 26 years.

Laurentide Paper Makers Hold Interesting Discussion

C. R. Van de Carr, of the Laurentide Co., recently led a discussion on moisture in paper and drying, which was participated in by the two free shifts of paper makers, backtenders and third hands from the paper mill. The meeting was entirely informal and throughout was aided by a liberal supply of smoking material. There was no formal paper presented by the leader of the discussion but some outline of the importance of the presence of moisture in the finished paper was given and suggestions were made as to the prime importance of attention to drying problems. This was very brief and was followed by a discussion on all hands of ways and means.

On the same evening members of the Laurentide staff entertained H. F. Bullard, manager of the Dryden Paper Co., at the Laurentide Club. In recognition of the fact that Mr. Bullard had been one of those principally concerned in the organization of the club a particularly interesting party was engineered.

N. B. Workmen's Compensation Board Wins Decision

The Bathurst Co., Ltd., has lost its case against the New Brunswick Workmen's Compensation Board in the Supreme Court of Canada. The board appealed to the highest tribunal in Canada against a decision of the New Brunswick Supreme Court, which was in favor of the company. The latter has refused to pay the assessment levied on it by the board on the following grounds: the company deserves a special rate because of the operation of a compensation system of its own; the board is extravagant and salaries and expenses of the board and its staff consumes about 40 percent of the moneys received from levies.

The litigation has now been going on for about three years, and is estimated to have cost over $25,000. Indications are that the company will appeal to the Privy Council at London, though no definite decision has been made according to Angus McLean, president and general manager.

A. P. W. Building New Mill at Sheet Harbor

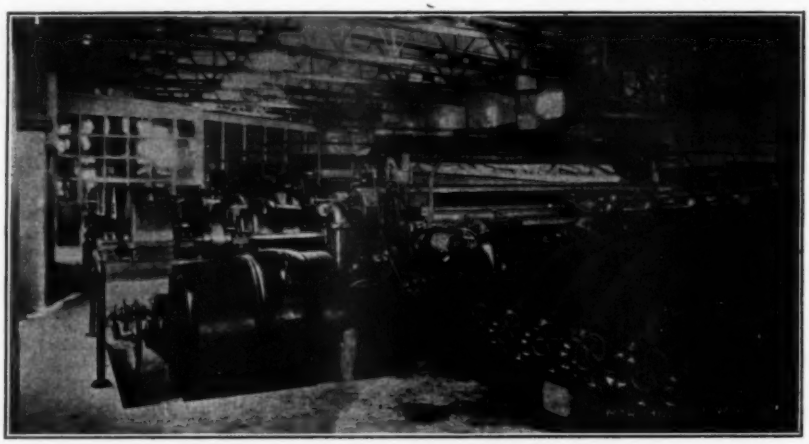
The contract for the erection of the building at Sheet Harbor for the Albany Perforated Wrapping Co., of Albany, N. Y., has been awarded to the Parsons-Ed Co., of Moncton, N. B. The main building will be 175 x 80 feet, of reinforced concrete and brick.

The contract also includes the installation of the equipment, including the grinding and barking systems. The mill is to be ready for operation early in 1925. The power will be supplied by the St. Margaret's Bay hydro-electric station, an agreement having been effected whereby the company secures the electric current at a very cheap rate. In addition to the pulp mill there will be erected shipping piers to accommodate both steam and sailing vessels, with suitable warehouses.

It is also intended to erect cottages for the employees, but a start on this will not be made until about midsummer. Several representatives of the A. P. W. Paper Co., including R. K. Jones as manager, are at Sheet Harbor supervising arrangements for the construction work.

J. R. Booth, one of the leaders of Canada's lumber industry and of the pulp and paper industry, celebrated his 97th birth-

HARLAND



Drive on Laurentide High Speed Newsprint Machine

Sectional Electric Drive

THE FIRST SUCCESSFUL METHOD OF CONTROL FOR DRIVING PAPER MACHINES BY SECTIONAL ELECTRIC MOTORS

Still Foremost

24 Drives in Operation and on Order

Ask the Users About Results

WE CAN NOW QUOTE FOR THIS EQUIPMENT MADE IN U. S. A.

The Harland Engineering Co. of Canada Limited——Montreal

Canadian Section

day on the 5th of April. Possessed of a wonderful vitality, the result of a life practically spent in the open, Mr. Booth, despite his weight of years, is a picture of rugged health. Undeterred by a recent illness which confined him to his home from December until the middle of March, he drives daily to his mills and makes a tour of inspection.

Riordon and Miller Bros. Win Safety Competition

At the annual general meeting of the Ontario Pulp and Paper Makers' Safety Association, places were awarded in Class A and Class B in connection with the annual accident prevention competition.

The winners in Class A, which includes mills employing 200 people or more, are the Riordon Co., Ltd., of Hawkesbury, Ont., with a record of sixty non-fatal accidents involving lost time of 481 days, which is equal to 1.1 days lost time per full-time employee. The winners in Class B are the Miller Bros. Co., Ltd., Glenmiller, Ont., with a record of one non-fatal accident, involving lost time of 12 days, which is equal to .27 day lost time per full-time employee.

Merger Talk Dying Out

Talk of a merger in the St. Maurice Valley between two or more of the large newsprint producers has died down somewhat, but is being occasionally revived. A significant indication was given at the annual meeting of the St. Maurice Paper Co. by President Wallace.

After pointing out that he could not speak freely on the subject as other companies were involved in the negotiations, he stated that several investigations had been made all of which had shown the St. Maurice properties at a level much higher than that at which they are carried on the books. One appraisal showed a value of $210 per share of the capital stock, and another appraisal is being completed at the present time.

Quebec Has New Forest Protective Service

Henri Keifer, engineer, has been appointed director of the forest protection service of the Province of Quebec. This service will include some twelve inspectors in charge of as many districts into which the province will be divided. These inspectors will have under them a number of assistant inspectors who will be in direct contact with the forest rangers. The jurisdiction of the new service will extend to all lands belonging to the Crown and not under lease and to settlers' lots.

Forest protective associations maintained by the limit holders will protect the private limits and the leased timber land, but the forest protection service will co-operate by all means in their power.

Claims Airplanes Ineffectual as Fire Patrol

The Ontario government was recently criticized for "replacing fire rangers with airplanes in northern Ontario." It was said that this measure had been carried out "over the unanimous protest of the expert staff." The United States had spent millions in experimenting with airplanes for years, it was said, and proved them a washout in forest protection.

In answer to this criticism, the Ontario forestry department says that it is unfair to condemn the plan on account of the American failure, as conditions are entirely different from those under which the Americans made the trials. The districts patrolled were mountainous, while in Ontario they are lake regions where more careful survey is possible and landing easier.

Continental Wood Products to Build New Power Dam

The Continental Wood Products Co., Elsas, Ont., has engaged engineers to prepare plans for the new power dam, in preparation for the Kraft pulp mill of seventy-five tons capacity, which will be erected at Elsas.

The new plant will be the most up-to-date in its line on the continent. The saw mill of the company will double its output this season owing to cutting heavy lumber and timbers for the Kraft mill construction. The company last year built eleven cottages for employees and many more will be put up this summer to take care of the men engaged in the erection of the new mill.

Running Successfully Under New Management

The Nipigon Pulp and Paper Mills, Ltd., which established a groundwood plant of 70 tons' capacity at Nipigon, Ont., and afterwards went into liquidation, changed hands some time ago and is now operated by the Nipigon Corporation, Ltd., at Nipigon. All the equipment has been thoroughly overhauled and put in excellent condition. The three lines of grinders are now operating at full capacity.

The company reports that it purchased all its requirements in the way of pulpwood locally this season, the groundwood finding a ready market both in Canada and in the United States. The labor situation has presented some difficulty, as skilled help is practically unknown in the Nipigon district.

Developments at Backus-Brooks Progressing Rapidly

The enterprise which the Backus-Brooks Co. has been carrying out at Kenora, Ont., during the past year and a half is of great magnitude, and to date over $3,000,000 has been expended in all phases of the development. The new paper machine has been put in operation and everything is progressing satisfactorily.

When the full plans are carried out it is believed that the pulp and paper development at Kenora will be the largest of any in Ontario. The groundwood plant is at present turning out about 80 tons a day.

Howard Smith Co. Buys Kinleith Mills

It has just been reported that the Howard Smith Paper Mills, Ltd., have purchased the Kinleith Paper Mills, Ltd., at a very advantageous figure. The Kinleith Co. has its mill at St. Catharines, Ont., and turns out about 20 tons per day of book and writing paper, and supplies a wide clientele in competition with the Howard Smith concern.

It is understood that the purchase was effected for practically the value of the good-will and that the new owners take over the old firm's contracts, and will supply the requirements of these from their own mills, and close up the St. Catharines mill.

Howard Smith Earnings Pass 1923

According to a high official of the Howard Smith Paper Mills, up to the present 1924 earnings show a very satisfactory increase over those of 1923. The mills are at present working at about 80 percent of capacity. With regard to export business, all countries with the exception of India and Mexico show a very satisfactory increase.

Mexico has fallen off considerably on account of conditions arising out of the revolution, while in India, German and Scandinavian competition are particularly keen. Domestic trade is satisfactory and showing a steady growth over 1923.

Gives $1,000,000 to University of Paris

Mr. and Mrs. H. Biermans, of Shawinigan Falls, P. Q., have made a gift of $1,000,000 to the University of Paris. The money is to be used for the erection in the new Cité Universitaire of a building to provide lodging for Belgian students, and also for students from Limburg and from Luxemburg, priority being given to Belgian students.

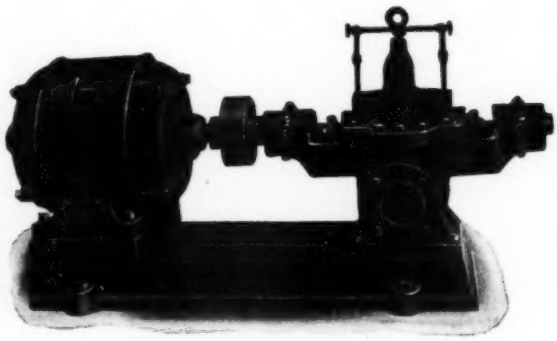
Mr. and Mrs. Biermans are of Belgian origin. Hubert Biermans is president and general manager of the Belgo-Canadian Paper Co.

It is likely that a new forestry building will be erected in connection with Toronto University during the coming winter. The building will be situated on St. George St., and will cost about $100,000. The edifice will be approximately 50 x 40 feet, and will be such that it will accommodate the whole Faculty of Forestry, which at present receives lectures in the building in Queen's Park, Toronto. The present building will be continued as the Botany Building. It is hoped that the

THE CEASELESS GRIND

Seldom is machinery called upon to do such steady work as pumps. Often they are in action for long periods of time without stop or rest.

And no pumps have been more capable of standing this ceaseless grind than Smart-Turner pumps. Their records prove it.



W 247
The improved type of horizontally split-shell centrifugal

Fishers Steam Specialties

Order from us

The Smart-Turner Machine Co., Limited

HAMILTON, ONTARIO

Representatives: Vancouver, Winnipeg, Hamilton, Toronto, Montreal, St. John (Canada)

"THE CREST" for March, 1924, asks the question:

"How long will it be before production will be worrying about how to accommodate orders rather than how to keep machines busy?"

ANSWER: Buy at Home and Buy Now.

CAPITAL WIRES

Paper and Pulp Mill Wire Cloth of every description.

PHOSPHOR BRONZE **BRASS**

CAPITAL WIRE CLOTH & MFG. CO., LTD.

OTTAWA, CANADA

Canadian Section

new structure will be ready at the commencement of the session of 1925-26.

Carthage Mach. Co. to Open Canadian Branch

The Carthage Machine Company of Carthage, whose principal lines of manufacture are the machines used in pulp and paper mills, is about to open a Canadian branch at Belleville, Ont. A Canadian charter has been secured and the Dominion branch will be known as the Carthage Machine Company of Canada, Limited.

The company has taken over the entire plant, property and lands of the J. C. Wilson Manufacturing Company in Belleville which includes a modern manufacturing plant rated as one of the best in the city. The main buildings were erected in 1916 and are of the latest construction. The plant is located at the entrance of Belleville harbor and switches from both the Canadian Pacific and Canadian National Railways run from the nearby lines to the premises.

Lumber Company Sells Timber Limits

The limits of the International Land and Lumber Co., Ltd., now in bankruptcy but at one time having its offices in Ottawa and in St. Felicien, Lake St. John, P. Q., were sold to the Riverside Manufacturing Co., of Shawinigan Falls and Three-Rivers, P. Q., for the sum of $210,000. Rolling stocks were sold for $15,000.

The rights purchased are on limits extending 280 square miles, located on the River Ashuapmouchouan. The Riverside Manufacturing Co. is said to be closely connected with the Belgo Pulp and Paper Co. of Shawinigan Falls, which has some limits in close proximity to the ones above referred to.

Fraser Pulp to Erect Power Plant

The Fraser Pulp mill at Millbank, N. B., closed down recently for a short time in order that repairs might be made. The company intends installing a power plant of its own, the Bathurst Co., which has been supplying hydro power, being unable to continue the present service.

It is expected that the new power plant will be put in operation in the first few days of this month. Both warehouses of the company on each side of the river are filled with pulp awaiting the opening of navigation for shipment.

Urge Financing of Forest Products Laboratories

George Carruthers, President of the Canadian Pulp and Paper Association, with a number of leading pulp and paper mill executives, waited on the Minister of the Interior at Ottawa, at the beginning of April, urging action along the lines of research.

This action follows resolutions passed at the annual meeting of the Association in January, whereby it may asssist in financing the Forest Products Laboratories of Montreal if certain conditions are complied with.

At the formal opening of the new club house of the Spruce Falls Co., at Kapuskasing, Ont., E. J. Jones, general manager of the company, outlined the objects of the club. He said he hoped it would be the means of bringing about a proper community spirit. Mr. Shattuck, a director of the Spruce Falls Co., made the presentation of the building to the employees, and in so doing said that the directors had but one request and that was that its facilities be used to capacity. Addresses were delivered by prominent people from Kapuskasing, Cochrane and Iroquois Falls.

The report of the movement of cars in the yard of the Abitibi Power and Paper Co., at Iroquois Falls, Ont., for the year 1923 shows a total of 30,801 cars handled in or out. Of the large items, there were 6,853 empty cars in and 9,663 empty cars out. There were 5,993 cars of paper sent out, and 2,052 cars of coal, 172 cars of limestone rock, 88 cars of alum, 24 cars of oil, 737 cars of pulpwood from the T. & N. O., 5,342 cars of pulpwood from the Abitibi Railway, and 148 cars of sulphur received.

An issue of $1,471,200 of 7 percent first refunding sinking fund gold bonds is being made by the Howard Smith Paper Mills. These are offered to the public at 98 and interest, yielding 7.2 percent. The issue is for the purpose of retiring $200,700 of first mortgage bonds on the Cornwall plant at maturity on September 1st next, to complete payments on timber limits, and to reimburse the company for expenditures at Cornwall and other mills. The financing will bring the net working capital to $1,258,460.

Work Started on Humber Bay Project

The pulp and paper mills to be built at Humber Bay, Newfoundland, will be among the most important in the British Empire. The mills will be located at a center known as Corner Brook, and a start has been made in the excavation work, the anticipation being that the mills will be able to start operations early in 1925, either partly or wholly.

About one thousand houses will be built for the workmen, in a regular townsite which has been approved by the town planning authorities of Newfoundland. The British and Newfoundland interests who are back of the project expect to employ about 5,000 to 6,000 men when manufacturing operations start. But for the support of the Newfoundland Government, the big industry would likely have been located in Eastern Canada.

Dawe Leaves for Australian Visit

A. L. Dawe, manager of the Canadian Export Paper Co., has left for Australia. His company, which acts for many of the largest Canadian mills, has an agency in Australia and sells considerable paper there.

It is said that while his visit has no special significance, still, as for some time efforts have been made to have Canadian newsprint admitted into the Commonwealth on the same conditions as that from Britain, it is quite possible that Mr. Dawe may do a little missionary work. Canadian mills would like to get back a share of the Australian market.

On the 1st of November last, Jos. and Chas. Lavoie, who were employed by the E. B. Eddy Co., of Hull, P. Q., in the forest near Parent, were drowned while crossing the Gatineau River in a canoe belonging to the company. Two actions, for $5,000 each, have been entered against the company by the father of the two men, charging gross negligence against the company, which, it is claimed, allowed the two men while on duty to risk their lives in a boat which was not fit for the requirements.

The Thunder Bay Paper Co. recently announced that construction would be started soon on an addition to its present pulp mill which, with the addition of grinders, wet machines and presses, would increase the pulp making capacity from the present 65 tons a day to between 100 and 120 tons a day. Fifty men will be added to the permanent force of employees. The company has also recently constructed slips and docks and has purchased two barges for the transportation of its product to mills at Wisconsin Rapids.

In discussing in the House of Commons, Ottawa, an estimate of $1,150,000 for the protection of timber and the management of forest reserves, Hon. Charles Stewart, Minister of the Interior, stated that approximately one billion more feet was destroyed than was manufactured in Canada annually. One-half of the total timber losses of Canada were by fire. More drastic measures of prevention must be taken. The Department of the Interior proposes to utilize the Royal Canadian Air Force for the detection of fires this year.

Upon the adjournment of the annual meeting of the Brompton Pulp and Paper Co. a resolution was adopted authorizing the directors to go ahead with the acquisition of additional timber limits. This comprises 45,000 acres of which part is in Quebec and part in Maine. It was formerly held by the Howard Estate. Conservative estimates indicate a pulpwood content of 500,000 cords, plus about 65,000,000 feet of pine lumber. The limits are advantageously located with low freight charges to the Brompton mill.

Raw material for the operation of the new pulp mill of the Great Lakes Paper Co., at Fort William, Ont., is now arriving by rail and 10,000 cords of pulpwood are piled on the ground

COMBUSTION ENGINEERING CORPORATION LIMITED
POWER PLANT EQUIPMENT
STOKERS OF ALL TYPES
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INDUCED AND FORCED DRAFT FANS
DIESEL OIL ENGINES
ECONOMIZERS
HEAD OFFICE—TORONTO
VANCOUVER, MONTREAL, WINNIPEG

while there are 30,000 cords more coming in by rail and water. The right has been secured from the city of Fort William to boom in front of the property on the Kaministiquia river. The new pulp plant, which will have a capacity of 180 tons of groundwood daily, is expected to start operations towards the end of the month.

A. K. Hinds, general manager of the Carthage Machine Company, will be president of the Canadian company. F. S. Wilson, president and principal stockholder in the J. C. Wilson Manufacturing Company for many years, will be vice-president, and Addison F. Wardell of Watertown, president of the Carthage Company, will be secretary and treasurer.

The plant of Gummed Papers, Ltd., Brampton, Ont., is being extended. A new building, 90 x 150 feet, has been put up and is nearly completed. Progress on the work has been somewhat impeded by frost. The company manufactures cloth lined and gummed papers, waterproof papers, cloth tapes, stay papers, etc.

The average daily newsprint production of the Spanish River Pulp and Paper Mills during the month of March was 698 tons, and the 700 ton mark was reached on several occasions. This means that the mills have been running to capacity, and there is every prospect of this continuing.

The Capital Wire Cloth and Manufacturing Co., Ltd., of Ottawa, Ont., has recently placed an order for four large wire weaving looms to weave to a width of 260 inches each. They will begin the erection of a new addition at the earliest possible moment, to house this new equipment.

Fire of undetermined origin broke out in one of the warehouses of the Barrett Paper Mills, Joliette, P. Q., on the evening of the 27th of April, when the building and stock were destroyed. The damage is estimated at $5,000 and is partly covered by insurance.

While loosening logs from a pile of 100,000 cords at St. Casimir, Portneuf County, P. Q., two men employed by the Brown Corporation were wounded, one fatally and the other seriously, by an unexpected tumble of logs disturbed by a blast of dynamite.

The rapids of the St. Francois River, known as the Ulverton Kingsley Falls power were leased by auction by the Department of Lands and Forests of the Quebec Government, to the Canada Paper Mills, Windsor Mills, P. Q., at an annual rental rate of $505.

The head office of the Bellevue Paper Mills has been changed from Belleville, Ont., to Montreal. The mills manufacture straw and chipped paper for corrugation purposes, pleated carpet lining, etc.

Good progress is being made with the addition to the plant at Brompton, Ont., of Gummed Papers, Ltd. The new addition is nearly completed and will be occupied at an early date.

When you are considering the purchase & installation of PAPER MACHINERY in CANADA,—
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THE DOMINION ENGINEERING WORKS, LIMITED, IS AT YOUR SERVICE TO PREPARE DESIGNS AND SUBMIT PROPOSALS
DOMINION ENGINEERING WORKS LIMITED
MONTREAL CANADA
PAPER MACHINES - I.P. MORRIS HYDRAULIC TURBINES
PAPER MILL PUMPS

Canadian Section

Although the normal production of Kraft pulp at the Dryden Paper Co. mill at Dryden, Ont., is about 65 tons per day, since the receivership the company has cut down this production to about 30 tons of pulp, making sufficient only for their own paper requirements. They are selling practically no pulp at the present time in the United States market.

The Belgo-Canadian Paper Co. has been able to increase its earnings since the last of its new paper machines was brought into operation, and it is understood that they are now running at the rate of about 15 percent on the common shares. This is equivalent to about five and one-half times preferred stock dividends. With its new machines Belgo has a capacity of about 115,000 tons of newsprint a year, and it is now a nicely rounded-out newsprint producing company.

Seven hydroplanes will be engaged in patrolling the forests of Northwestern Ontario from White River on the east to the Manitoba boundary on the west, this season, and considerable reduction in the ground staff of forest rangers will be made as a result of a new program decided upon by the Ontario Department of Lands and Forests. Two of the planes will be stationed at Fort McDiarmid, on Lake Nipigon, and five at either Ignace or Sioux Lookout.

At a meeting held in Montreal at the end of March between the representatives of the forest protective associations and the Canadian National Railways, the latter profferred its complete co-operation, including that of its fire-fighting equipment, and its radio and telegraphic facilities, and proposed the appointment of a committee to meet the forest protective associations for the purpose of finding solutions to such problems as may arise.

Speaking in the Ontario Legislature Hon. Jas. Lyons, Minister of Lands and Forests, stressed the importance of Northern Ontario's pulp industry to the Province and said that it was the intention of the Government to work out a policy that would provide a continuous supply of raw material, not only to existing industries, but to any others that the Government might approve in perpetuity. A general survey of Ontario timber resources would be undertaken very soon.

The remaining part of the old townsite of Kapuskasing, commonly called Stewartville, was destroyed by fire early in the morning of the 11th of April. The total losses are estimated at $200,000, which are partly covered by insurance. The cause of the fire is unknown, but is suspected to be a deliberate case of arson. Owing to there being no water works in that part of the town, it was very difficult to fight the fire.

Fairchild Aerial Surveys have recently completed the purchase of a Huff-Daland hydroplane which may be equipped with pontoons, wheels or skis, according to the nature of the work. This is only a part of the Surveys' summer equipment, as it is hoped to bring back to Grand'Mère a Curtiss M. F. flying boat. This will give the organization three planes and will put it in a position to do very satisfactory work for its clients.

The St. Maurice Power Co., a subsidiary of the Shawinigan Water & Power Co., which supplies a considerable amount of hydro-electric energy to the pulp and paper mills of the St. Maurice Valley, is now producing 30,000 horsepower, its first unit having been put into operation on the 14th of April. This unit has been completed nearly three months ahead of schedule, and the work on the remaining three units is progressing satisfactorily.

The International Fibreboard Co., of Midland, Ont., of which H. J. Wiser is general manager, is operating to capacity in its new plant. The company was burned out some months ago in Penetanguishene and moved to the neighboring town of Midland, where a suitable building was acquired and equipped. It is reported that the company is planning the installation of another plant in the near future.

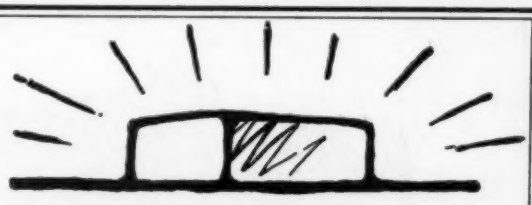
A preliminary report presented to the Running Streams Commission of the Province of Quebec points out that the storage of waters at Lake Kenogami by the two dams at present under construction will assure a regular water course available for the industries of nearly 1,800 cubic feet a second. This will allow the operations of all mills during the whole of the winter effective from next fall.

C. E. French, of the Howard Smith Paper Mills, has returned to the Toronto office after nearly a year spent in the interests of the company in South America, where he established in the various Latin countries satisfactory business connections in the shape of substantial orders for standard mill watermarks, and other grades such as blotting, bristol, and patent coated folding boxboard.

As usual, repair operation and cleaning of the old Well and Canal were carried out at the beginning of April, so that all pulp and paper mills operating along the canal were closed down for ten days, during which necessary repairs and overhauling of equipment were executed. The principal mills affected are the Lincoln Mills, Provincial Paper Mills, Ontario Paper Co., and Interlake Tissue Mills.

Price Bros. & Co., Ltd., won a petition of right against the Government of the Province of Quebec in connection with the delimitations of the Seignory of Little Metis, the amount indirectly involved being said to reach over $500,000. The decision is one of the most important given out for some time affecting the pulp and paper industry in the province of Quebec.

Dr. Milton L. Hersey, member of the Harbor Commission of Montreal and president of the Milton Hersey Co., Ltd., consulting chemists and engineers, has been elected to the board of directors of the Brompton Pulp and Paper Co.



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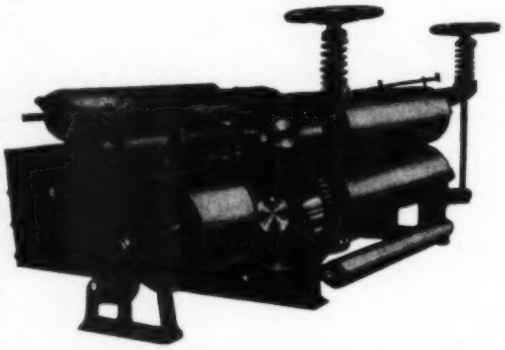
CARTHAGE

The Carthage Line of Pulp, Paper and Bag Mill Machinery Represents the Best



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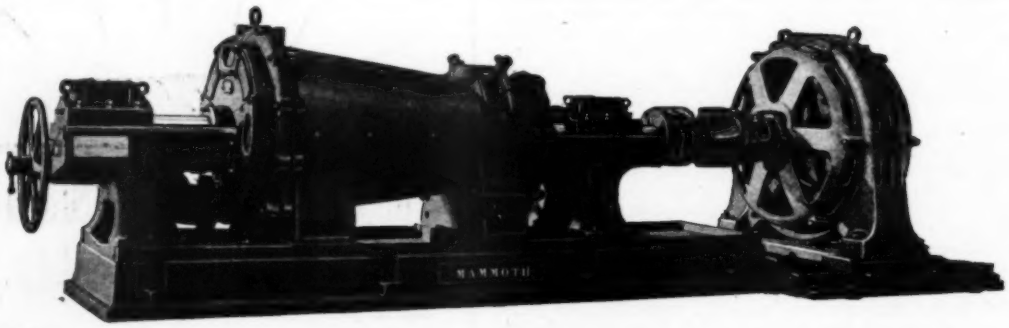


NOBLE & WOOD Jordan engines, because of their consistent satisfactory service, year in and year out, on all grades of stock, have become the recognized standard of comparison. The best advertisement of any product is a list of satisfied users and it is very gratifying to note on our list, not only the number of users, but also the quality papers being made in our Jordans, the different grades of papers made, and the large number of repeat orders for more of our Jordans.

It is only through many years of experience as Jordan builders that so enviable a reputation can be built, and it is the benefit of this experience which we offer to mills seeking better Jordans.

Jordan Builders for over 30 years

THE NOBLE & WOOD MACHINE CO., Hoosick Falls, N. Y., U. S. A.

Canadian Builders: Port Arthur Shipbuilding Co., Ltd., Port Arthur, Ontario

New England News

May 1, 1924.

One of the most encouraging factors in the situation throughout this district is the relatively good showing which the merchant pulp manufacturers are making in the face of hot competition on Scandinavian pulps. Whether, as some claim, the writing paper mills are using more domestic sulphite the fact remains that New England pulp makers have maintained operations on a generally good percent of capacity throughout the first four months of 1924. That competition with Scandinavian pulp is keen can be seen in a recent incident that developed locally. The Boston & Maine Railroad announced what amounted to a substantial reduction on woodpulp from Boston to Arrowhead, Frankfort and Little Falls, N. Y. Immediately protests were heard from northern New England pulp manufacturers. The reductions made by the Boston & Maine were doubtless to meet competitive rates via New York, Philadelphia or other ports but they cut under the rates from such points as Berlin, N. H., to these New York state points and were construed as favoring the foreign pulp makers. It is expected that the rates from these New England mills will be adjusted as a result.

Another feature of the raw material situation is the fact that paper mills were one of the few classes of New England bituminous consumers who bought substantial blocks of coal at the recent prices of $5.50 on cars, Boston for New River.

Otherwise business is contracting. In a few exceptional instances we find paper mills such as the Pejepscot Paper Co.'s plants at Bowdoin and Lisbon Falls resuming operations after a long period of idleness, but generally the opposite condition prevails. The American Writing Paper Co. has been endeavoring to economize to the greatest possible extent by concentrating its production at the Holyoke mill. In pursuit of this policy the Chester Paper Co.'s division of Huntington, Mass., has been closed and the paper made there formerly will be hereafter produced at Holyoke unless business so improves as to warrant reopening of the outside property. Two months ago the company closed the Hurlburt Mfg. Co.'s division at South Lee and have been making the paper at Holyoke. The policy is obviously a sensible one and is bound to show results. As the American Writing Paper Co.'s difficulty is one of the few outstanding sore spots in the New England industry it is good to see the company progressing steadily to a sound basis under the guidance of Mr. Willson, the president and receiver. If the company could disregard its debts contracted prior to receivership it could show an actual profit on the basis of operations since that time, something that has rarely happened before in its history.

George W. Wheelwright

Seldom have so many spontaneous tributes to the character of a man appeared than were made after the death of George W. Wheelwright, chairman of the board of the George W. Wheelwright Paper Co. Mr. Wheelwright died at the Charlesgate Hospital, Boston, on April 13. Mr. Wheelwright was 80 years old, and had been in poor health for some weeks, having undergone an operation early in the year which left him in a greatly weakened condition. He was one of the best known of the older generation and his kindly nature, absolute integrity and reputation as a maker of quality papers give him a permanent place in the history of the New England paper industry.

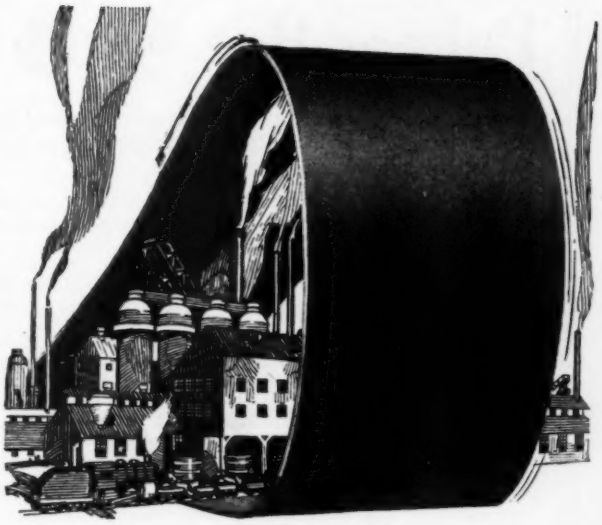
Mr. Wheelwright entered the paper business with his father during the Civil war, being too young for service, and has been in it steadily ever since. Although relinquishing active control to his sons a few years ago, he remained in active touch with the business until forced to quit by sickness. He developed the famous Dove Mill Bristols, and the company has been a well known manufacturer of book papers. Last year the company formed the Rollstone Paper Co. with the assistance of Louis T. Stevenson to manufacture greaseproof papers at the Fitchburg, Mass., plants. Mr. Wheelwright, Sr., was actively interested in this venture also.

The George W. Wheelwright Paper Co. will always be known for the meticulous care with which it observed its contracts and maintained its word and the quality of its papers. It was a standard of honor in the business of Boston. The late Mr. Wheelwright's character was reflected in this reputation of his company.

Surviving him are George W., Jr., president of the company, William, Robert, Henry and D. Page Wheelwright, and Mrs. De Forest Lockwood, the only daughter. His wife passed away during the past year.

The Rainbow Paper Corporation, with mill at Windsor, Conn., was sold at public auction on April 17.

Nothing takes the place of **Leather**



So that you may know

ONE belt gives you years of unfaltering service. Another is useless after a few power-wasting months.

There is a mighty difference between them. Yet when new they look alike. Appearance cannot tell you which will wear. How will you *know?* This was the problem which years ago led to the Graton & Knight Standardized Series—the one sure guide to definitely known belting service.

What is the "Standardized Series"?

The Standardized Series is a grouping of brands of Graton & Knight Leather Belts. These brands include exactly the right belt for practically every transmission job. Each brand is made to rigid specifications for lasting service on its particular type of drive.

Each brand is so carefully standardized throughout its manufacture that two belts of the same Standardized Series brand are always alike.

Graton & Knight Standardized Series gives you always the right belt for the right job. Tough, pulley-hugging belts of honest, rugged leather. Painstakingly made to give better power transmission.

Write for booklet **101-S**, which gives full information about Standardized Series Belts for paper mills.

THE GRATON & KNIGHT MFG. CO., Worcester, Mass.

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Standardized
LEATHER BELTING

The Last Word in Power Transmission

Palmer-Bee TRADE MILL REG. U. S. PB MARK TYPE PAT. OFF. Speed Reducers

Provide a simple and compact means of transmitting power from electric motors to conveyors, elevators and machinery of all kinds.

They are designed to operate continuously under all conditions of service, and to eliminate the hazards of belts, chains and open gearing.

They insure that dependability of power supply which is essential to continuous production in every plant.

They are in use in some of the largest and most up-to-date *Paper Mills*, Automobile and Body Plants, Cement Mills and Tire Factories in the country.

They are backed by twenty years' experience in the gearing and power transmission field.

Ratios from 3 to 1 up to 4000 to 1.
Range of Horsepower 1/4 to 200.

Every reducer installed in accordance with our recommendations is absolutely guaranteed to give satisfaction

ASK FOR BULLETIN NO. 42

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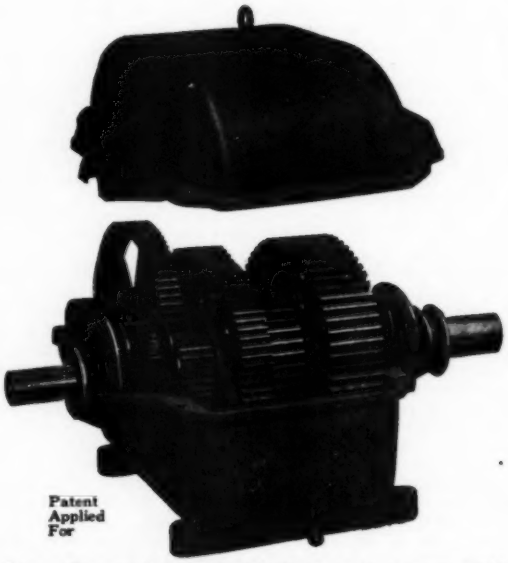

Cover Removed—Entire Mechanism in Lower Half of Casing

Real Accessibility!

The Hidden Costs of Paper Production

The most expert Efficiency Engineer in the World would find it difficult to gauge accurately the actual loss occasioned by the stretching, slipping and breaking of inferior belting.

Every mill operator, however, knows that there is such a loss figured on a basis of power wasted, idle machinery, etc., and does what he can to eliminate it.

By actual experience it has been proved that the Republic Belts designed and made specially for paper mill work, reduce this hidden cost to a minimum.

Any paper manufacturer who has ever used Republic Invader or Double Cross Belting will substantiate this claim.

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Youngstown, Ohio

REPUBLIC BELTING

Variety of Fuels for New Plant

A most unique but efficient boiler plant addition has been built onto the end of the building and roofing boiler room, Bird & Son, Inc., at Norwood, Mass. The enlarging of several of the company's divisions is directly responsible for this addition. In the building and roofing division the steam is a vital part of the process; so vtal that a shutdown cannot be tolerated.

Therefore the new plant has been constructed with an eye to all possible fuels, also for the purpose of efficiently disposing of the waste from the mill, chips, paper board ends and cuttings, poor material that fails to pass inspection, etc. This stuff is burned most of the time in this addition, but it is also equipped with fuel oil burners and coal grates so that either coal or oil can be used during those periods when no waste is available. The shift from coal to oil also is a matter of a few hours' work. The 250 H. P. Heine boiler has been rebuilt and is fired similarly to the other three boilers in this plant.

International Reparations Not Granted

The International Paper Co. was refused a verdict of reparation in their case versus Boston & Maine Railroad on certain shipments of wood pulp from Wilder, Vt., to Livermore Falls, Me. The International pointed out that the sixth class rate of 19.5c charged was excessive, exceeding, as it did, other rates for approximately the same mileage by 4½c. Also they pointed out that a 15c rate was in effect in the reverse direction. What makes the case of some interest, as it would probably apply in other cases, is the contention of the Interstate Commerce Commission in its decision that the movement was not regular and was made because the company's Glen Falls mill in New York was down.

That the movement in the opposite direction was regular or at least more substantial, they alluded to, but added that it did not constitute basis for equal treatment on reverse direction shipments in any case. The reparation between the 19.5c and 15c rates therefore was refused evidently on these grounds of insufficient tonnage regularly moving.

Great Northern Makes Satisfactory Labor Agreement

The Great Northern Paper Co. reached an agreement with its employees on April 15 after an all-day conference with the union leaders at the company headquarters, 201 Devonshire street, Boston. The agreement provides for another year at an unchanged wage scale and existing working agreements. The settlement was announced by John P. Burke, president of the paper makers' union.

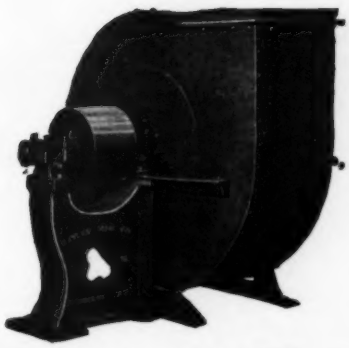
The agreement affected every class of workers in the company's organization with the exception of woods labor, viz., carpenters, paper and pulp makers, firemen, electrical workers, and machinists. The St. Croix Paper Co. made a similar settlement for its employes at Woodland, Me., on the following day. It will be recalled that the Great Northern has consistently maintained higher wages than other New England newsprint mills.

H. R. Lewis for the past few years connected with the Van De Carr Paper Co. of Stockport, N. Y., and previously superintendent of the East Walpole mill of the Hollingsworth & Vose Co., has returned to the latter company as superintendent of their West Groton mill. Mr. Lewis was secretary and general manager of the Van De Carr Paper Co. He is welcomed back to the H. & V. fold and with his experience and knowledge of the company's papers is expected to fill an important place left vacant by the recent resignation of R. B. Livermore.

Creditors of the Northeastern Paper Co., a well-known mill supply company of Cambridge, Mass., whose bankruptcy petition was recently announced, include a total of claims of $117,080, according to the records in the Boston court. Assets are stated as uncertain, nevertheless actually amount to about $24,000.

Case of the American Sulphite Pulp Co. versus the Burgess Sulphite Fibre Co. involving the infringement of patent on digester linings by the predecessors to the present Brown & Co. of Berlin, N. H., which was decided against the American Sulphite Pulp Co. holding the patent, has been appealed. The appeal will be heard in the First Circuit Court (Federal) at Boston some time in the fall.

You have no right to take a chance; the other fellow may have to take the consequences.—"Making Paper."



Exhaust Fan ECONOMY

Economy in exhaust fans is not measured entirely by a saving that may be made in first cost.

Over a long period in operation the savings that are effected in power costs will save the amount of the investment several times over.

And then — the continuous, dependable operation that is in-built in every Bayley Exhaust Fan must be considered as economy, for it insures against interrupted operation and suspended processes.

For removing dust from rag room, material from chippers, barkers and grinders, Bayley Exhaust Fans will exactly fit every need.

They are sturdily constructed throughout. The blast wheel is of particularly strong design and will easily withstand the shock of oversize material and large chunks of wood.

Investigate Bayley construction before you purchase exhaust equipment.

Bayley

MANUFACTURING CO.
748 Greenbush Street
MILWAUKEE, U. S. A.

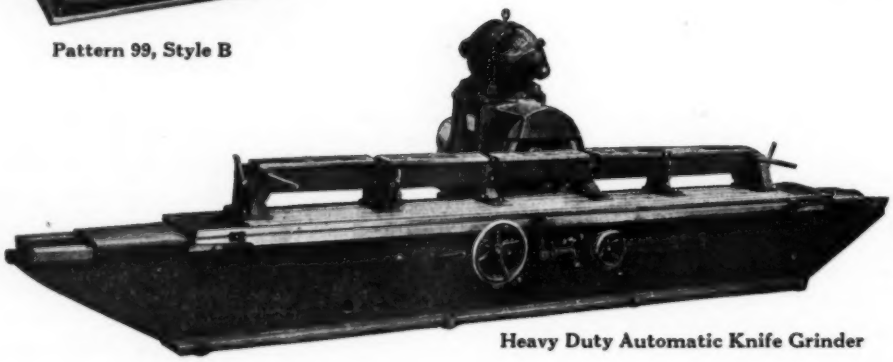
18

Pattern 99, Style B

WE build grinders to grind knives from 30 inches to 17 feet in length for belt or motor drive.

May we send you literature describing them in detail?

We also manufacture grinding wheels.



Heavy Duty Automatic Knife Grinder

THE SPRINGFIELD MFG. CO.

320 Mt. Grove St. Bridgeport, Conn., U. S. A.

"HALLOWELL" Steel Lift Truck Platform

Pat's Pending

The "Hallowell' Runners are constructed of heavy angle steel to which are attached steel leg holders of a special and substantial design. These parts are joined by large rivets, hydraulically driven, a method which prevents any possibility of their working loose.

This detail of construction is of vast importance as unless the legs are rigidly and permanently attached to the runners they will gradually become wobbly and unreliable, occasionally collapsing.

The "Hallowell" joints remain tight—they cannot do otherwise.
This and other features, along with its low initial cost, combine to make the "Hallowell" a very interesting proposition.

Manufactured by

Standard Pressed Steel Co., Jenkintown, Pa.

The "Pioneer" Steel Hanger people

Clifford K. Judd, president of the Judd Paper Co. of Holyoke, is to be the speaker at the first paper conference to be held May 20th at the Hotel Westminster in connection with the convention of the National Association of Purchasing Agents during that week. On the following day at the Copley Square Hotel, S. L. Willson, president of the American Writing Paper Co., will be the speaker at a second conference on paper problems.

Creditors of the Cushnoc and Kennebec Paper Companies have endeavored to prove that the affairs of the two bankrupt concerns are so interwoven that the proceedings against both should be made joint. The court at Portland it is understood has granted this request. It is felt that only by merging the proceedings can the assets which are placed at $880,000 for both companies be conserved. The liabilities for the two total to some $2,100,000.

Oxford Paper Co. has changed its sales methods in the New England territory. Formerly its famous lines were sold here direct through the Seaman Paper Co. It is understood that this agency is to be discontinued and the paper in the future will be handled by the Andrews Paper Co. with offices in Boston, Springfield, Providence, Hartford and New Haven.

Memorial to E. H. Haskell

A memorial service to Edward H. Haskell, one of the founders of the Great Northern Paper Co., was held at the First Baptist Church, Newton Center, Mass., on Friday, May 2.

Co-operating with their distributors to the utmost extent possible, the Worthy Paper Co. have staged a most successful exhibit of their papers in the Rice Building, Boston, adjacent to the offices of their local representatives, Arthur E. Ham & Son. The exhibit was on view previously at the Paper Industries Exhibition in New York during convention week.

On Tuesday, May 6, the New England paper mills most affected by the recent increase in pulpwood rates laid their formal protest before the Public Service Commission of Maine at Augusta. The increase was put into effect by the Maine Central Railroad last February, since when the mills have been seeking a hearing to secure suspension.

Loss by fire of a large volume of cotton sweepings at the mill of Bird & Son Co. at Philippsdale, R. I., is reported.

Northern New York News

May 1, 1924.

Int. Paper to Discontinue "C. R." Mill

Partial answer to the question which has been puzzling northern New York paper mill circles, namely, what is to be done with the mills of the International Paper Company in the Watertown district, came during the past month. In his annual report to the stockholders of the company President Philip T. Dodge made the definite statement that manufacture of paper at the middle, or "C. R." mill had been permanently discontinued for good reasons. This was expected, inasmuch as this mill has not been running since the strike two years ago. Mr. Dodge also touched upon the plan to develop the powers hydro-electrically.

"The development and consolidation of the water powers to give a materially greater amount of power has been carefully planned, together with the introduction of electric generators from which surplus power may be sold," said Mr. Dodge.

Shortly following this announcement came an admission from officials of the Northern New York Utilities, Inc., of Watertown, that they were negotiating with the International for the International power at Sewall's island, where the paper company formerly had a sulphate plant and where it still has a ground wood mill. The sulphate plant was destroyed by fire several years ago. The power amounts to several hundred horsepower. Officials of both the paper company and the Utilities denied that there had been any negotiations for the powers at Glen Park, on the Black river, two miles below Watertown.

Sues to Recover Contract Price

Charles E. Eaton, mill engineer of Watertown, has started a supreme court action against the Oswegatchie Paper Company of Natural Dam, N. Y., for the recovery of $7,000, with interest, and unpaid balance on commissions for drawing the plans and specifications for the new mill of the defendant company, acting as consulting engineer and supervising the

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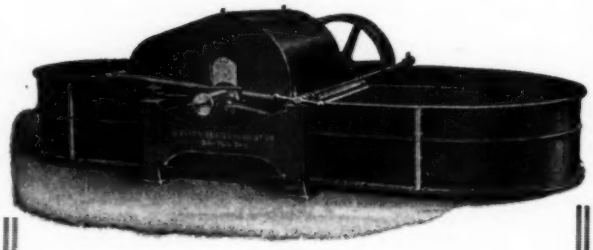

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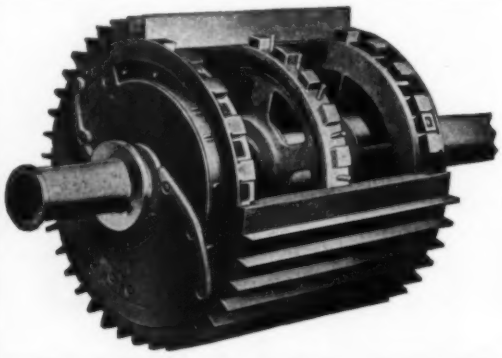

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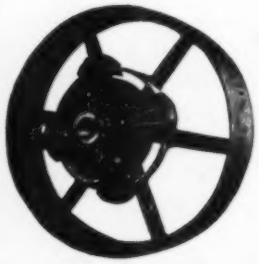

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MANUFACTURED BY
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construction of this plant. This mill was built in 1922 and 1923. Mr. Eaton alleges that the contract called for the payment to him of $12,000, and that he has received only $5,000.

The company sets up in answer to the complaint that Mr. Eaton's plans and specifications were incorrect and improper so that the mill after construction was not of sufficient length to house the paper machine and as a result it became necessary to build an annex to house the machine screens. It alleges that there were other serious defects in the plans submitted by Mr. Eaton which later proved costly to the company to remedy.

Celestin C. Burns

Celestin C. Burns, of Watertown, general manager of the St. Regis Paper Company for several years, died at the New York Hospital April 21, after an illness of several years. Although in poor health for about eight years his serious illness dates back to November, 1920, when he was stricken with hemorrhages of the stomach. He was 57 years old.

Mr. Burns was one of the best known paper manufacturers in northern New York. He was one of the syndicate which in November, 1916, purchased the stock of the St. Regis Paper Company held by G. H. P. Gould of Lyons Falls, N. Y., and George W. Knowlton of Watertown. Others in the syndicate were Floyd L. Carlisle, Frank A. Empsall and D. M. Anderson, besides some New York capitalists. Under the new purchasers, with Mr. Carlisle as president and Mr. Burns as general manager the company began a policy of development and expansion which has added greatly to the value of its holdings.

Mr. Burns was for many years associated with the Northern New York Utilities, Inc., and was instrumental in developing many water powers in northern New York. He was for a year a member of the city council of Watertown.

Mr. Burns left an estate valued at between $600,000 and $700,000, consisting largely of securities of the St. Regis Paper Company and the Northern New York Utilities, Inc., of which syndicate the St. Regis Company is the controlling factor. Mr. Burns made bequests to several Catholic institutions and to friends and relatives, but the bulk of the estate was left to his widow.

Interest Shown in Wage Dispute

During the past few weeks a series of wage conferences has been held in Watertown between Floyd L. Carlisle, president of the St. Regis Paper Company and Hanna Paper Corporation, and representatives of the unions. Mr. Carlisle has sought separate agreements this year with the employees of the St. Regis mills at Black River, Deferiet and Herrings and the Hanna mills at Norfolk, Raymondville and Norwood.

A proposal was submitted to the unions that the present wage scale be continued on the basis of a two year contract, or that the owners and employees enter into a five year agreement with the rate of pay to be decided each year. As both propositions are contrary to the union constitution, which forbids any but one year contracts, the employees were hesitant about accepting, and May 1, the date when the old agreements expired, found the conferees without having reached any agreement.

The mills are continuing in operation, however, and the employees are to vote finally on the proposition of Mr. Carlisle not later than May 11.

Wood Grinding Service Hearings Resumed

Hearings will be resumed this month before Judge Frank Cooper of United States district court in the action brought by the Wood Grinding Service, Inc., of Watertown, against the International Burr Corporation, also of Watertown. The latter corporation is charged with infringement on a patent and the suit asks the court to order discontinuance of the defendant which are alleged to constitute such infringement.

The Wood Grinding Service, Inc., sells to paper manufacturers a process of pulp grinding which makes it possible to produce newsprint paper with a minimum percentage of sulphite pulp, thereby decreasing production costs.

Robert Wark

Robert Wark, aged 52 years, superintendent of the St. Regis Paper Company mill at Deferiet, died at his home April 3 after an illness of two weeks of pneumonia.

Mr. Wark, who was born in Montreal, entered the paper making industry as a young man. He served his apprenticeship as a machine tender in Montreal, but 36 years ago came to the United States. His first position in this country was as night superintendent of a paper mill at Wilder, Vt. He

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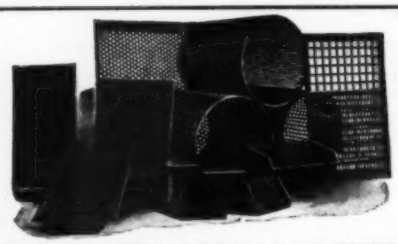

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Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

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remained there for 20 years, going from there to Glens Falls, where he served for two years as assistant superintendent of the Finch-Pruyn Company. From Glens Falls he went back to Canada and St. Raymond, where for the next eight years he served as superintendent for the News, Pulp and Paper Company. From there he went to East Angan, Canada, for a year as superintendent, coming to Deferiet four years ago as power boss. Later he was made assistant superintendent and last January was promoted to superintendent.

Howland to Leave the Paper Industry

Amos G. Howland, for nearly 35 years connected with the paper mill interests of the late George C. Sherman, is soon to leave the paper industry to retire to Warner, N. Y., where he will become associated with his son in a coal business. Mr. Howland is vice-president and general manager of the Wood Grinding Service, Inc., a subsidiary organization of the Sherman Paper Company. Mr. Howland became associated with the late Mr. Sherman in 1889 and has been connected with his interests continuously since that date.

The Wood Grinding Service, Inc., is the successor of the firm of Hall, Ward & Walker, and the Hall Process Corporation.

An idea of the value of the product of the paper mills of Brownville and Dexter, two villages within ten miles of Watertown on the Black River, is contained in a report which the chamber of commerce of Watertown has just prepared. The purpose of the survey was to show that from an economic standpoint the presence of these mills was a great asset to Watertown. The principal products of the two villages for the year were pulp, paper and paper bags. Of paper alone there was produced 27,315 tons. The total value of all products was $4,327,181. Despite the water power resources available the mills consumed 37,887 tons of bituminous coal. There was paid out in salaries $237,519 and in wages $728,856.

J. J. C. Downey, sales manager of the National Paper Products Company at Carthage since November, 1920, and C. J. Roberts, assistant sales manager, have resigned. John A. Frost, for the past four years head of the purchasing department, has been promoted to manager of the sales organization. Another shift at the National Paper Products Company came when Leon Halliday was appointed office manager to succeed D. W. Sarvey, who will devote his time to looking after the interests of the fox farm owned by a firm of which he is a member.

A new hydro-electric development capable of generating 10,000 horsepower is being constructed at High Falls on the Beaver River by Harry S. Lewis of the J. P. Lewis Company, which operates two paper mills at Beaver Falls. The development is being undertaken by the Beaver River Power Corporation, another Lewis company. The Northern New York Utilities, Inc., of Watertown, is also about to undertake the development of the Soft Maple dam on the Beaver River, where from 20,000 to 30,000 horsepower will be developed.

The International Paper Company is installing at its mills at Piercefield, N. Y., a supplementary steam plant along the lines recently developed in Scandinavia. The system is made necessary by the fluctuations in rainfall and repeated stoppage of the mill in whole or in part. The mill is devoted to the manufacture of high grades of paper. The new system will permit the continuous and economical operation of the boilers and the conservation and secondary use of surplus steam.

Change of venue from Franklin county to Jefferson county has been granted in the action brought by the Malone Paper Company of Malone, against T. H. Van Dyke and Company, Inc. The paper company seeks to recover judgment of $299,000, charging that the defendant company is responsible for a breach of contract made in 1913 for the purchase of 25,000 cords of pulpwood. The trial will probably be held during the May term of the supreme court in Watertown.

All previous records of the Deferiet mill of the St. Regis Paper Company were broken in one 24 hour period in the middle of April. The total tonnage for the period was 190 1/10 tons. The previous record was 187 1/5 tons.

Mark A. Hanna of Cleveland was re-elected president of the Champion Paper Company of Carthage at the annual meeting held last month. Other officers were re-elected as

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STEEL SHELL BURRS YELLOW JACKET SHOWER

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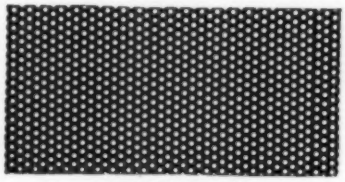

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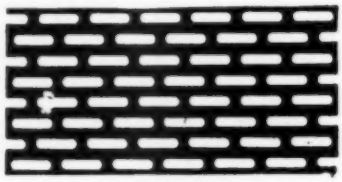
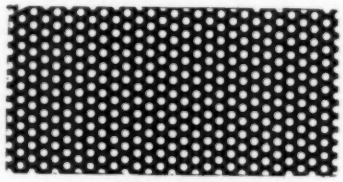


⅛ x ½" Slots



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follows: Vice-president, Carl H. Hanna of Cleveland; secretary-treasurer, Ralph B. Maltby of New York; assistant secretary-treasurer, Clarence T. Wright of Carthage. F. P. Wadley of Watertown, George M. Seaman of Chicago and J. B. Seaman of New York.

Reforestation operations are being carried out by the St. Regis Paper Company at a ten acre nursery conducted at St. Regis Falls. The company has been carrying on this work for the past three years and next year will begin the transplanting of their own trees, which they will set out on their property at the rate of 1,000,000 a year.

Walter J. Zaph, who has been assistant secretary and treasurer of the Carthage Sulphite Pulp and Paper Company, has been appointed assistant treasurer of the Dunn Sulphite Company of Port Huron, Michigan, and has already entered upon his duties. His family will join him this month.

Edward S. Lansing, assistant to the president of the Bagley & Sewall Company, manufacturers of paper machines, has returned from an extended trip to the Pacific coast, during which he inspected some of the largest paper mills in the coast section.

The Algonquin Paper Company of Ogdensburg, which a few weeks ago set a world's record of 97 tons of paper produced in 23 hours on one machine, broke that record April 7 when in 24 hours the machine produced 102.9 tons of paper.

James Shufty

James Shufty, 61, former superintendent of the Remington pulp mill at Black River, and also connected with paper mills at Watertown and Brownville, died April 12.

New York City News

New York, May 1, 1924.

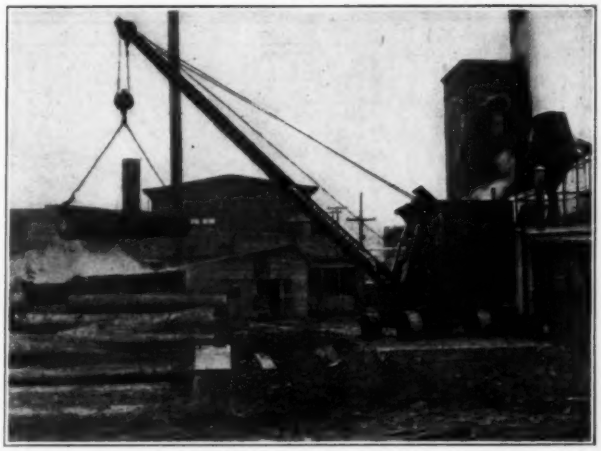
A new paper jobbing concern under the firm name of Green, Low & Dolge, Inc., has been organized by Alfred W. Green, Fred G. Low and Oswald A. Dolge, all formerly with Henry Lindenmeyr & Sons, and has been incorporated under New York State laws. The new concern has taken a lease on the warehouse formerly occupied by Blake & Decker at 50 East Eleventh street, New York, and it will do a general jobbing business in paper, carrying a complete stock of standard papers for every printing requirement. Mr. Green, president of the new corporation, was with the Lindenmeyr firm for four years as manager of sales, while Mr. Low, vice president, was for seven years with Henry Lindenmeyr & Sons as sales promotion and advertising manager. Mr. Dolge, secretary and treasurer of the new concern, was for six years on the sales staff of the Lindenmeyr firm.

At the annual meeting of the Paper Association of New York City, whose membership comprises practically all of the large paper jobbers in the metropolis, Kit S. Warner, of the John F. Sarle Company, was elected president for the ensuing year, succeeding J. C. Mallalieu, of George W. Millar & Company, Inc., who had completed his second term. Other officers elected included George W. T. Skinner, of Skinner & Company, first vice president; William H. Holden, of Holden & Hawley, Inc., second vice president; B. T. Blake, of Marquardt, Blake & Decker, Inc., secretary, and A. C. Damon, of Paul E. Vernon & Company, treasurer. The directors elected were A. C. Damon, William H. Holden and B. T. Blake.

Frederick C. Ritger, a Newark attorney, has been appointed temporary receiver for the Tri-State Pulp and Paper Company, of 790 Broad street, Newark, N. J., with a mill at Highbridge, N. J. The appointment was made by Vice Chancellor Backes who directed the corporation to show reason why the receivership should not be continued. Application for a receiver was made by Frank G. DuBois, secretary and treasurer of the concern, who is also a creditor with a claim of $21,748. The papers filed stated that the assets of the company are $118,000 and the liabilities $131,598. The company was incorporated under Delaware laws on September 22, 1920.

Katzenstein & Keene, Inc., importers of papermaking rags, have removed their offices from 200 Fifth avenue to 50 Church street, New York.

A. W. Taube, formerly with Marquardt, Blake & Decker, is now associated with Vernon Brothers, paper merchants, of



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To buy a machine simply because the manufacturer builds only a certain size is poor economy. Our cranes range in capacity from 5 tons to 50 tons and are designed for handling small pulpwood with a grapple or single logs weighing up to 10 tons.

They are mounted for traveling on railroad track or on the ground surface and may be equipped with either electric, gasoline or steam power.

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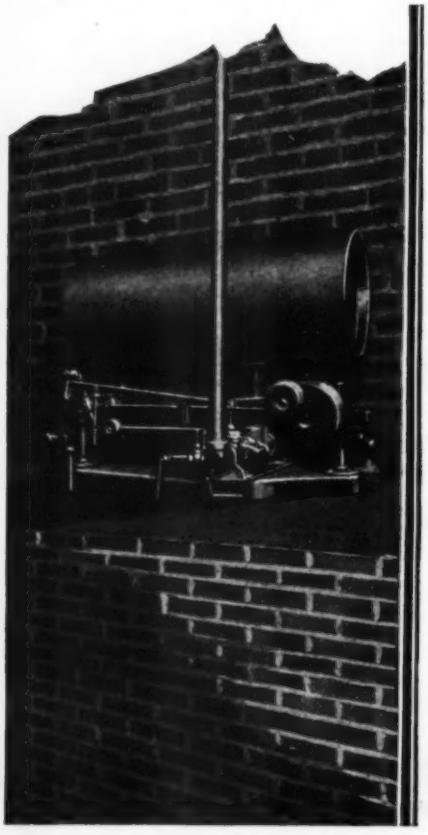

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Why not drain the water from your paper machines, dryers, evaporators and mill heating system with a Morehead Back-to-Boiler System? It will not only keep your steam lines clear and dry, thus enabling every pound of coal to do its maximum work, but also the condensation will be returned to your boilers at high temperature.

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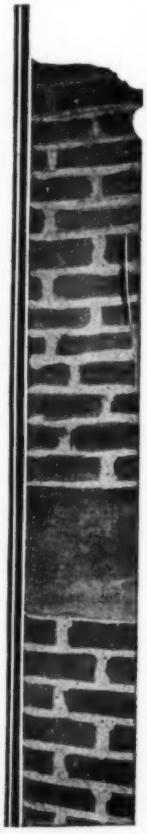
POSITIVELY DRAINS ALL TYPES OF STEAM APPARATUS, DELIVERS CONDENSATION AND FEED WATER TO BOILERS UNDER ALL CONDITIONS AT MAXIMUM TEMPERATURE



66-68 Duane street, New York, and will specialize in the sale of book and coated papers to publishers and printers. Mr. Taube was for many years in charge of manufacturing for the Frederick A. Stokes Company, publishers, and is well acquainted with the paper needs of the publishing trade.

At the annual meeting on April 23 of the International Paper Company, whose headquarters are in this city, H. C. Phipps was elected a member of the Board of Directors for three years in place of Herman Elsas, who retired. Ogden L. Mills was elected a member of the board for two years and Owen Shepherd for one year.

Stuart Henry was appointed receiver under $25,000 bond by Judge Learned Hand for the Manitou Paper Company, dealers in wall paper, with offices in the Fisk Building, Broadway at Fifty-seventh street, New York, on April 7. Liabilities were placed at about $71,672 and assets at $126,000.

Warren G. Merrill, for the past several years sales manager of the J. E. Linde Paper Company, of New York, is now connected with the Reading Paper Mills, of Reading, Pa., whose sales office is located at 352 Madison avenue, New York. Mr. Merrill will cover the New York and Philadelphia territory.

The Gatti Paper Stock Corporation, Joseph Gatti president, has moved its offices from 200 Fifth avenue to the Liggett Building at 41 East Forty-second street, New York, corner of Madison avenue. The concern operates a large packing plant in Hoboken, N.J.

S. J. Fisher, Inc., dealers in papermakers' supplies and specializing in old rope and scrap bagging, have moved their offices and warehouse from 309 Water street to 263 Front street, New York.

The Keith Products Company, Inc., paper jobbers and mill agents, of 417 Lafayette street, New York, has filed notice of an increase in capital stock from $10,000 to $50,000.

H. J. Grey Company, jobbers of a general line of coarse papers, has moved from 163 Greene street to larger quarters at 228 East Forty-fourth street, New York.

Eric V. Bowater, of the Bowater Paper Company, 342 Madison avenue, New York, returned a few days ago from a several months' trip to Europe.

Wisconsin News

May 1, 1924.

Wisconsin to Organize for Prevention of Forest Fires

Plans and preparations have been made by the Forestry Department of the State of Wisconsin for the prevention of forest fires which will cover the entire state, each section being protected. According to reports made by the state conservation commission, special fire prevention districts will be organized this spring into which the entire forest section of the state will be grouped. Each district will be protected by organized fire fighters.

This fire prevention campaign was inaugurated during the Forest Protection Week, which was April 21-26, that week having been designated by President Coolidge. Governor Blaine will also be asked to issue a proclamation enlisting the aid of cities and towns and various organizations of the state. It is also expected that the Federal Government will co-operate with the State Department in this campaign.

The plan that is being followed by the Conservation Commission is outlined in letters which are sent to all town chairmen in the state, asking for their aid and support in carrying out the plan. The fire districts have not as yet been determined definitely but will be fixed within a very short time. This is the first time that anything of this nature has been undertaken by the state in the organizing of fire prevention districts.

The following is a synopsis of the letters sent to town chairmen by Conservation Commissioner Elmer S. Hall:

"The conservation commission is going to make a special drive this year to reduce uncontrolled land fires in Wisconsin. A study of the reports of town chairmen shows that 528,299 acres were burned over during the year 1923. It is safe to say that not less than a million acres were actually burned over. Damage of over $200,000 resulted, not considering the loss of millions of young trees, thousands of birds, serious destruction of natural scenery, serious disturbance to game of all kinds,

COMBATING CORROSION

PROTECTION, durability, economy and good appearance, the qualities demanded in an efficient paint for steel structures and equipment, are all embodied in Bitumastic Solution.

Protection Possessing the well known preservative qualities of bitumen, Bitumastic Solution gives real protection. It prevents contact between the steel and surrounding air and moisture and so prevents corrosive action. It is not affected by moisture, weather conditions, sulphurous gases and other chemical fumes. It stands up exceedingly well against high temperatures, its heat resisting quality being a prime feature.

Durability Bitumastic Solution is exceptionally long-lived. It bonds firmly to the surface painted. Will not chip or peel. Does not dry out or evaporate leaving a porous coating of pigment, but retains its integrity for a prolonged time.

Economy Economy is the direct result of the durability of Bitumastic Solution. Giving long-time service, frequent repairing is not necessary, saving not only the cost of paint, but also the labor of application, which is far more costly.

Appearance Bitumastic Solution has a high, glossy finish that adds to the appearance of any plant, factory, building or piece of equipment. Its hard surface sheds dust instead of allowing it to cling. The gloss does not wear off in a short time, but remains bright and shiny and gives a sense of satisfaction and pride to the owner or engineer.

Uses Among the many purposes for which Bitumastic Solution is used are the protection of sheet metal roofs and buildings, structural steel, steel sash, boiler fronts and breechings, stacks, pipes, tanks, air washers, fans and ventilating ducts and other steel structures.

Write our nearest office for information regarding the solution of any particular corrosion problem you may have, or ask for sample can.

BITUMASTIC

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17 Battery Place, New York

322 So. Delaware Ave. Philadelphia

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FOSTER VALVES

Cross "W"

A PRESSURE REGULATOR FOR CONSTANT SERVICE

Double-seated. Suitable for CONSTANT service where regulator is not expected to hold tight. Two standards. The working internal parts are drop forged steel, case hardened. Renewable seat-rings.

FOSTER ENGINEERING CO., Newark, N. J.

Pickles' Patent Automatic Steam Regulator FOR Paper Making Machines

Which absolutely control the drying of the sheet. Installed on sixty days' trial

W. F. PICKLES **Buckland, Conn.**

ECONOMIZERS

Reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 28 years of service.

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SUPERHEATERS

Improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK

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MANUFACTURERS OF

ROCK MAPLE WASHER ROLLS AND TEXTILE WET FINISHING MACHINERY

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Steel Plate Construction

Steel Storage Tanks, Blast Furnaces, Gas Holders
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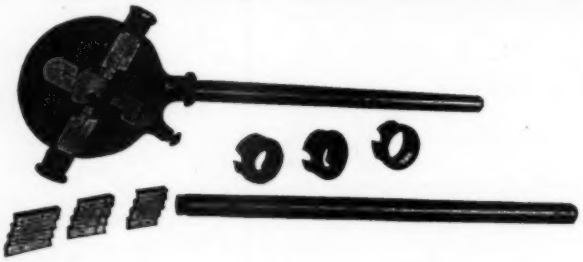


A New "TOLEDO" For Cutting Over or Undersized Threads

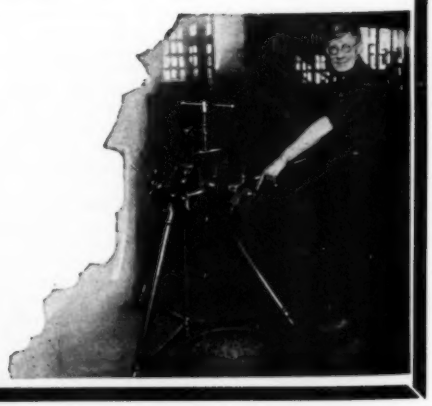
This "Toledo" No. 1A has for 20 years been the most popular ratchet tool for threading 1" to 2" pipe. It is light, compact, and will reach the out-of-the-way job with ease; cutting the smooth, long tapered threads with a few easy strokes of the ratchet handle.

It is now equipped with special taper pins that permit a quick, positive and wide adjustment for cutting over or undersize, as well as standard threads, a most desirable feature especially when tight joints are as necessary as in the paper mill.

This "Toledo" No. 1A is but one model of the complete "Toledo" line of pipe threaders and cutters up to 12", all of which are the last word in pipe tool equipment.

Drop us a card for complete catalogue.

"TOLEDO"



THE TOLEDO PIPE THREADING MACHINE CO. TOLEDO, OHIO

New York Office **50 Church Street**

impairment of water flow—a loss which would run into millions of dollars if it could be tabulated.

Town chairmen have a particular responsibility in connection with these fires. By law they are town fire wardens and are duty bound to do all within their power to prevent fire and to suppress fires should they start. They should make this fire question one of the major items in their town affairs. The state this year will make a special effort to prevent fires in areas subjected to unusual risks, through organization of special fire protection districts. In this work the federal government will participate. The President of the United States has seen fit to emphasize the importance of this Forest Protion Week. If there is a conservation warden in your county he is authorized to represent this commission in forest fire affairs. We want to assist in every reasonable way, but inasmuch as these fires are caused primarily by local agencies we believe they should be handled primarily in a local way."

Wisconsin is sure on the right track in this work and the results should be very interesting.

De Pere Mill to Increase Production

Officials of the American Writing Paper Company, which operates a mill in De Pere, Wis., recently visited the property and gave out an optimistic report as to prospects for increased activity.

A. M. Forsythe, in charge of sales for the western district, with headquarters in Chicago, accompanied by G. M. McCarthy of the sales department, spent two days in De Pere in conference with C. E. Garvin, superintendent of the mill, and went over in detail plans that are being made for the future that are expected to result in putting the mill in a position to warrant operation at somewhat nearer its capacity.

Mr. Forsythe is a former resident of De Pere, having been connected with the mill from the time of its construction in 1892, when his father, John Forsythe, was superintendent of the organization, then known as the Shattuck-Babcock mill. The mill was sold to the American Writing Paper Company in 1899 and at that time A. M. Forsythe went to Chicago. He severed his connection with the company in 1912 and after several years' service with another company came back to the company last fall.

Both Mr. Forsythe and Mr. Garvin said they were aware residents of De Pere were disappointed because the mill had not been run at full speed at all times, but they thought the reasons were apparent. According to Mr. Garvin the last few months have been the best that the company has experienced for the last two or three years, and with the sales organization in Chicago running in better shape and with more salesmen on the road obtaining business for the western division, there is every hope that a brighter future is in store.

A splendid improvement was made in the De Pere mill last summer with the building of a concrete bridge over the mill race and other improvements in the line of equipment are planned when heavy operations once more are resumed. About 130 persons are now employed in the mill proper in addition to office help and indications are that the present personnel will be maintained.

New Dam of Dells Holding Back Head of Water

For the first time since it was built, the new dam at the Dells Pulp and Paper Company of Eau Claire, Wisconsin, is now holding back a head of water, and power generators have been turned and have been put into operation with water-power from the new dam.

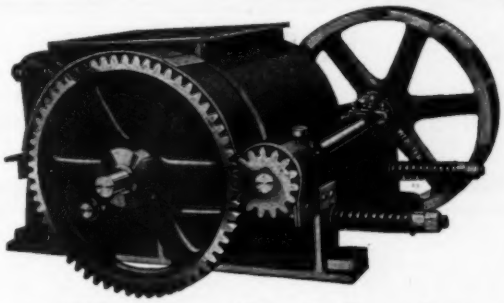
With the exception of the construction of freeboard or walk across the top of the structure, the new dam is now completed. Forms for the freeboard are now being built, and the pouring of concrete will soon be under way.

Foundations for the new pulp mill have been completed and bricklayers are now beginning on the structure proper. Generators for the operation of the pulp mill are also being installed.

All that now remains of the old Dells dam is the original structure that was built in 1877-78, under the famous 99-year contract, with a foot of 18 feet. The eight-foot flash boards that were afterwards put in brought the head of water to 26 feet.

The new dam, which is of reinforced steel and concrete, was built below the old dam which served to hold back water, took the place of the extensive coffer dams which would otherwise have been necessary in order to carry out the construction work. This new structure is 400 feet long and contains 13 steel tainter gates which are 26 feet wide by 20 feet high.

It is built to carry a two-foot higher head of water than the legalized head of water carried by the old dam, and the



A Webster Coal Crusher in Your Power Plant

will insure a regular supply of properly sized coal for your automatic stokers at a low cost per ton.

They are built in single and double roll types, in capacities to handle 30 to 200 tons per hour.

Shall we send you our catalog showing our various types and sizes of coal crushers?

THE WEBSTER MFG. CO.

4500-4560 Cortland Street
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Factories, Tiffin, O., & Chicago. Sales Offices in Principal Cities.

PRATT & CADY VALVES

Fig. 100
Bronze Renewable Ring Gate Valve

IT IS easy to renew the wearing parts of Pratt & Cady retaining ring gate valves without removing the valve from the line. Once installed it stays there! Large and comprehensive stocks at all times assure you prompt service.

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General Sales Office: Bridgeport, Conn.
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An Associate Company of the American Chain Co., Inc.

FOR SALE

One large type Marshall refining Jordan engine, used very little. EDDY PAPER CORP., Three Rivers, Mich.

Wanted

One Rebuilt Paper Slitter to take 36-inch roll of paper with ten sets of cutter heads.
The Dentner Mfg. Co., Inc.
Portland, Conn.

FOR SALE

Two (2) Fitchburg Steam Engines 40 H. P., 125 lbs. steam pressure; 20 lbs. back pressure; 70 to 125 R. P. M. Length of engine, 12'6"; width of engine, 6'8". These engines can be direct connected or a belt drive and are in A-1 condition.

Three (3) Noble & Wood 1,000 lbs. capacity Beating Engines; wood tub; 48 x 48" roll; 72 x 16½" pulley. These Beaters are in good condition.

Two (2) 63" Smith & Winchester Undercut Paper Cutters.

Address Box 62, Paper Industry.

FOR SALE

One 120" Fourdrinier Paper Machine—Equipped with Pusey & Jones new Century shake; two presses; 48" diameter dryers; calender; reel; Warren winder; self contained Marshall drive.

One 90" Fourdrinier Tissue Machine—Equipped with Pusey & Jones new Century shake; two presses; nine dryers 36"x86"; one calender; two drum reel; four drum Moore and White winder. Self contained Marshall drive.

Fourdrinier Parts—One 120". One 110". One 84" Pusey & Jones. One 86" Kutter Trowbridge.

Dryers—Nine 48"x116". Two 48"x111". Fourteen 36"x86". Nine 36" by 80".

Machine Calenders—One 104". One 84" ten roll. One 72" nine roll. One 72" seven roll. One 66" seven roll. One 58" five roll.

Slitters and Winders—One Moore & White four drum. One 120" Warren two drum. One 104" Kidder. One 90" Pusey & Jones single drum. One 36" Fales. One 27" Meisel.

Beaters—Three 72"x42" Noble & Wood. One 54"x60" Holyoke. Two 48" by 52" Holyoke. Two 52"x42" Downingtown Iron tub. Five Horne 36"x36".

Jordans—One Appleton Wagg Majestic. One Jones Standard for motor drive. Two Noble & Wood Monarch. One Noble & Wood Pony Monarch. One Pope Brushing engine.

Screens—One twelve plate Packer. One twelve plate New Success. Six, twelve plate Harmon.

Ream Cutters—One 69" Jones undercut. One 56". One 48". One 44" Smith & Winchester undercut.

Revolving Sheet Cutters—One 84" Horne. One 82" Clark. Two 60" Hamblet. Two 60" Finlay. One 62" Moore & White. One 48". One 45". One 42" Finlay with Hamblet drive.

Super Calendars—One 52" Holyoke. One 50" and one 48" Norwood. One 45" and one 40" Pusey & Jones.

Wet Machines—Bagley & Sewall 72". Horne 48".

Equipment for pulping old papers.

FRANK H. DAVIS CO.

175 Richdale Ave. Cambridge 40, Mass.

WANTED: Engineer for small mill in central states. One with Steam and Electrical experience preferred. State age and experience. Address all replies to Box 65, The Paper Industry.

Can You Help Find This Man?

A Salesman who has a preference for mechanical lines is wanted for a permanent position. Must travel the year 'round the Country where paper mills are located, selling such items as Felts, Wires, Supplies, etc., for a large and long-established manufacturer.

Should be between 35 and 40. Well set up—in good health and honest above all things.

Selling ability essential. Experience in the lines not necessary.

Salary $2500. to start. (Expenses paid.) Advancement as warranted by sales and service showing.

If you are qualified, or know anyone who is, write in detail to Box 64, The Paper Industry.

New STOKERS FOR SALE AND ERECTED

4—7 Retort Westinghouse
3—10'x8', 3—11'x8' and 2—12'x8' Murphy

Also Chain Grate and Model Stokers

Our Prices are the Lowest. Tests Conducted.

H. E. HUNTSBERY, Engr., 296 Broadway, New York

Guaranteed Perfect
Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. Petrolea, Canada

Every ball bears our registered trade-mark

foundation and piers were built sufficiently strong and of a height that will permit raising the dam to a height of 32 feet whenever it is found necessary to do so, and the city gives approval of a dam of that height.

The cost of the new dam, and the new pulp mill being built by the Dells Pulp and Paper Company will reach about a million dollars.

Mr. L. A. DeGuere, engineer, of Wisconsin Rapids, Wisconsin, designed the dam and it was built under his supervision.

Wisconsin River Mills Running to Capacity

Mills through the entire Wisconsin River valley, which have been seriously handicapped throughout the past winter and early spring by the exceedingly low stage of water in the river, some of which were forced to shut down one or two days per week, are again operating at full capacity. The spring rains, together with the melting of snow in the northern woods, has caused the river to swell considerably so that enormous quantities of water are now going to waste. The river is at present six feet above normal, and only a few weeks ago there was scarcely enough water in the river for most mills to run even electrical equipment to full capacity.

Water wheel grinders in all of the mills are now being run to full capacity, as well as all electrical equipment, and this will enable every mill in the Wisconsin River Valley to run to full production, as they will be able to grind plenty of groundwood which has been the source of most of the trouble which has caused the shut downs.

Every mill is able to handle the present volume of water without any trouble, as most of the dams are equipped with tainter gates. There is not the usual high head on account of the high tail water. No trouble whatsoever has been experienced as yet.

While the water is now at a very high stage there is no fear on the part of any of the owners that it will reach flood stage which will force a shut down, as there is not an appreciable amount of snow in the north and, unless some extra heavy rains come, the river will probably not get any higher than the present stage.

The water in the Wisconsin river during the past winter has been the lowest in a great many years, this caused by the comparatively few fall rains which are depended upon to fill the network of reservoirs in the northern part of the state, which are owned by all the power users on the Wisconsin river.

Improvement in Fox River's Telulah Mill

With every department operating at capacity, the Telulah mill of the Fox River Paper Company at Appleton, which has been enlarged and improved since the change in ownership, gives no indication of the dull period many other mills are experiencing.

From the rag department on the second and third floors of the new addition at the east end of the mill to the new finishing rooms in the extreme west end of the structure, all is activity, and the output now includes many specialties that formerly were not manufactured.

The plant is being made modern and up to date in every respect. A new coal conveyor system with automatic scale for weighing coal has just been installed and arrangements are under way for the installing of batteries of new water wheels and generators.

A new stockroom and dry loft are among the more recent acquisitions of the mill and it was only about a year ago that a filtration plant was added. A new elevator shaft equipped with the most modern outfit has been erected on the south side of the mill, conveniently located for loading and unloading freight cars.

Apparently it is the policy of the company to make its property as nearly perfect as possible. In doing so it has not overlooked the safety of its employees, who are protected in every way. Safety first is evidently the slogan of the mill, for the words greet one everywhere. Not only is the employee protected from injury by machinery, but likewise from electricity, and if the devices provided are used workers assume little risk.

New Riverside Plant About Ready

It is expected that the new mill of the Riverside Paper and Fibre Company of Appleton will be started some time in May. All of the construction work on the buildings has been completed, and as soon as the machine now being set up is ready this mill will be put into operation.

The new project includes new machine room, finishing room and stock room. The machine room is large enough for two machines, and the new 116" wide by 200 feet long paper machine built by Beloit Iron Works is now being set up. After

MILL EQUIPMENT

7—823 h. p. Stirling water tube boilers, 200 lbs. pressure. Babcock & Wilcox makers. Complete with Westinghouse stokers, forced draft fans, and all accessories.

2—300 h. p. Heine boilers, 150 lbs. pressure. Murphy stokers and accessories.

1—110' fixed radius coal handling crane. Capacity 250 t.p.h., 5½ yd. bucket.

7—18"x36" Allis-Chalmers 350 h.p. Corliss engines. Heavy duty mill type. Complete with Richardson-Phenix oil filtration and lubricating systems.

35—Welded steel digesters, capacity 1,300 cu. ft. Pressure 110 lbs. Mfd. by Continental Iron Works.

12—Kellogg hammer welded steel autoclaves, 300 lbs. working pressure, tested to 1,000 lbs.

2—Structural steel buildings, 85' 6" wide, 184' long, 75' 6" high. Covered with corrugated iron. Designed for heavy loading on floors.

3—42" Link-Belt apron feeders, 30' centers.

4—42" Link-Belt apron feeders, 10' centers.

1—24" Link-Belt conveyor, 110' centers.

2—24" Link-Belt conveyors, 180' centers.

1—24" Link-Belt conveyor, 225' centers.

1—66' cross-section, 24"wide, Link-Belt.

8—24" Buffalo exhaust fans with motors.

8—30" Buffalo exhaust fans with motors.

1—Roots Style D high pressure type blower. Capacity 890 cu. ft. per minute at 435 r.p.m.

2—Connersville blowers, double outboard bearing. Capacity 24.5 cu. ft. per rev., 3,200 cu. ft. per minute at 255 r.p.m.

5—2½" American Type A belt driven centrifugal pumps.

25—4" Baker belt driven centrifugal pumps.

75—5" Gould belt driven centrifugal pumps.

24—6" Baker belt driven centrifugal pumps.

5—14" Worthington Class B Centrifugal pumps, direct connected to turbine.

6—16" Allis-Chalmers Type S Centrifugal pumps, direct connected to turbine.

20—Six section No. 24 8-ft. Sargent dryers, with Model "M" self feeders, 12,556 sq. ft. heating surface to dryer. Equipped with mixing pickers, washers, rolls, concentrators, feeders, coils and fittings. Suitable for drying by-products.

500—Steel tanks, 100 to 55,000 gal. capacity, ⅜" to ⅝" plates. Write for Bulletin No. 7.

Bulletin No. 8 General Equipment
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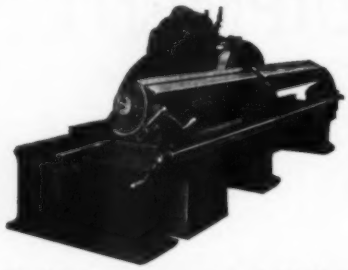
The New Grinder

For Paper Mills, Veneer Mills, and General Service Grinding



For all types of Paper and Veneer Knives, Shear Blades, and Edge and Surface Grinding.

Double the Accuracy and Half the Floor Space

The most massive, compact, accurate grinder manufactured. For Paper Knives and all classes of straight flat or bevel grinding. Full automatic, furnished with or without water, completely enclosed or open, with swivel bar or flat platen, for all classes of work. Cup, ring or sectional grinding wheel. Compact, long-lived, accurate.

State your requirements and get our recommendations.

Specialists in Saw and Knife Fittings and Accurate Grinding Requirements

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We build traveling crane and portable elevators of many types for both hand and electric operation.

Ask for Crane Catalog 100
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New Jersey Foundry & Machine Co.
90 West Street New York

THE LENIX* BELT DRIVE

"OLD TIMERS"

This Lenix Drive, installed in December, 1914, is operating in connection with a 250 H. P. motor driving a crusher at a New England trap rock quarry.

The superintendent says:

"The Lenix has always given good service. We have never found it necessary to do any repairs on same with exception of changing an occasional bearing."

The Lenix is not an idler. It is a "belt wrapper," scientifically applied to belt drives for the purpose of eliminating slippage and increasing the general efficiency of the drive.

Booklet, "Saving Slippage & Space," contains interesting data on belt drives. Send for a copy.

F. L. SMIDTH & CO., Engineers

50 Church Street New York City

* Registered

this machine is put into operation the old machine in the present mill will be moved into this new machine room.

The machine and finishing rooms are two stories, while the stock room is a five-story structure, all are built of re-inforced concrete. C. R. Meyers & Sons Company of Oshkosh, Wisconsin, had the contract for the construction of these buildings.

The new filtering plant, several blocks away from the mill, has also been completed and is a building 30 feet by 240 feet in size. All of the pumps, filters and piping have been installed. This plant has a capacity of 3,500,000 gallons, and is connected with the new mill by a 16" pipe.

Pulp will be handled by a gravity process from the stock house to the paper machines. The total cost of this new project will exceed half a million dollars.

A new office building 32 feet by 55 feet in size, two stories high, is being constructed, and this will be completed some time this month. Contract for this building was also let to the C. R. Meyers & Sons Co. The cost of this building will approximate $15,000.00.

Will Consider Ford's Power Application

Application of the Ford Hydro-Electric Company for permission to construct a dam for power purposes on the Menominee river has taken a new turn, it became known when the railroad commission announced it will hold a continued hearing on the application on April 2.

Because of the difficulty in obtaining complete control of the dam site and flowage rights, the Ford Company is contemplating organizing a Wisconsin public utilities firm, according to information coming to officials. This would permit condemnation privileges to obtain the remainder of the land and dam.

Unless the company can obtain such rights, it is probable that no permit will be issued to it by the railroad commission. The firm contemplates a $250,000 project on the Menominee.

Northwest Superintendent's Meeting Postponed

On account of the late season, the roads still being covered with snow at this writing and it is still snowing in Wisconsin, the Marinette, Wisconsin, Convention of the Northwest Division of the Superintendents' Association originally set for May 2nd and 3rd, 1924, has been postponed until some time in July, the date to be given publicity at a later time.

This action was also considered advisable because of the short time between the Marinette Convention of the Northwest Division Association and the Dayton Convention of the National Association, which latter is set for May 22, 23 and 24, and many desiring to attend both could not see their way clear to get away twice in the same month.

Safety Work in Nepco Mills

All records for no accidents have been broken in the Nekoosa Mill of the Nekoosa-Edwards Paper Company with mills at Nekoosa and Port Edwards, Wisconsin, as this mill has gone 83 days without an accident to May 1. There has been only one accident that has occurred in this mill since January 1, this being during the first part of February. This is some record for these mills, it being the best ever attained in any of this company's mills.

A safety contest is being held between the Port Edwards and Nekoosa Mills, and up to this writing the Nekoosa mill is far in the lead. Nekoosa mill employees are working hard to make a record that will be a world beater.

Offices of Outagamie Co. Moved to Appleton

The business of the Outagamie Paper Company of Kaukauna, Wisconsin, recently acquired by Mr. Judson G. Rosebush, President of the Patten Paper Company of Appleton, Wisconsin, is now being taken care of by the latter company.

The offices of the Outagamie Company have been removed from Kaukauna to Appleton to those of the Patten Paper Company. No changes have as yet been made in the operating force of the Kaukauna Mill.

The capital stock of the Patten Company has been increased from $100,000 to $1,000,000, amendments to the articles of incorporation of the company having been filed in the office of the Secretary of State at Madison.

Benton Resigns from Northern Paper Mills

According to reports from Green Bay, Mr. Homer Benton, Secretary of the Northern Paper Mills Company of Green Bay, Wisconsin, has handed in his resignation effective as of May 1. It is understood that Mr. Benton will return to Appleton and resume his law practice.

Mr. Benton had been connected with the Rosebush interests

DUXBAK BELTING
TRADE MARK
for
wet places,
dry places,
hard drives
—an ideal belting for paper mill drives
Send for Catalogue
DUXBAK BELTING TRADE MARK
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Tanners
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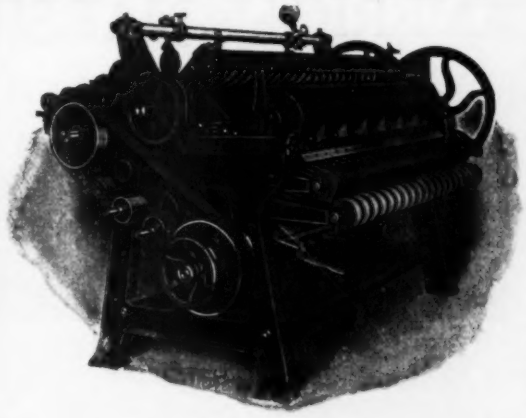
Branches and Distributors in All Leading Cities



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Single, Duplex, and Diagonal
CUTTER KNIVES
PATENT TOP SLITTERS
Hamblet Machine Co.
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CENTRIFUGAL PUMPS

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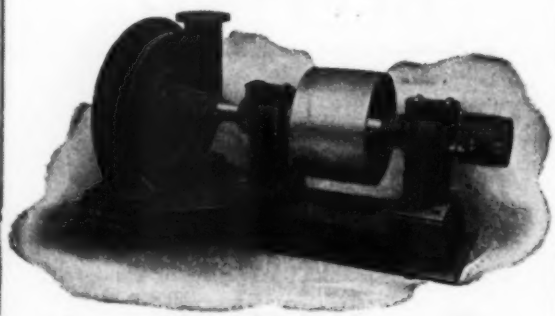

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Manufactured By

E. M. Cross Mach. Co.

BERLIN, N. H.

TABER PUMPS

Fig. 510 illustrates Taber Double Suction Centrifugal Pump

OVER 40 years of specialized pump building experience stands behind every Taber Pump. Is our "Silent Sales Engineer" calling on you regularly? If not, write for "him."

TABER PUMP CO., **Buffalo, N. Y.**

Builders of Centrifugal and Rotary Pumps

PUMPS

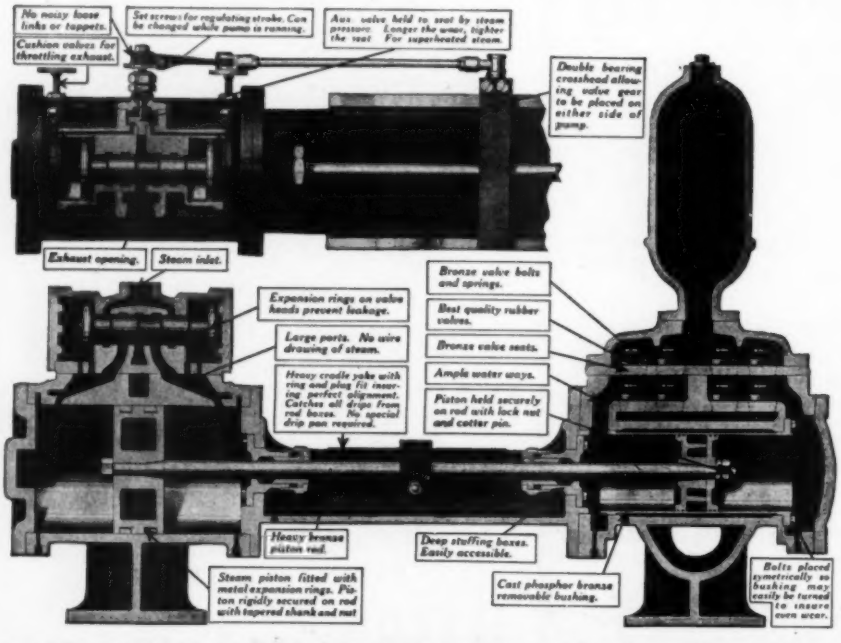
INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL

A Type for Every Service

THE GOULDS MANUFACTURING COMPANY
SENECA FALLS, N. Y.

GOULDS

AMERICAN-MARSH PAPER MILL PUMPS


No noisy loose links or tappets.
Set screws for regulating stroke. Can be changed while pump is running.
Aux. valve held to seat by steam pressure. Longer the wear, tighter the seat. For superheated steam.
Cushion valves for throttling exhaust.
Double bearing crosshead allowing valve gear to be placed on either side of pump.
Exhaust opening.
Steam inlet.
Bronze valve bolts and springs.
Best quality rubber valves.
Bronze valve seats.
Ample water ways.
Piston held securely on rod with lock nut and cotter pin.
Expansion rings on valve heads prevent leakage.
Large ports. No wire drawing of steam.
Heavy cradle yoke with ring and plug fit insuring perfect alignment. Catches all drips from rod boxes. No special drip pan required.
Heavy bronze piston rod.
Deep stuffing boxes. Easily accessible.
Steam piston fitted with metal expansion rings. Piston rigidly secured on rod with tapered shank and nut
Cast phosphor bronze removable bushing.
Bolts placed symetrically so bushing may easily be turned to insure even wear.

The line includes:

Centrifugal Stock Pumps
Wet Vacuum Pumps
Suction Box Pumps
Boiler Feed Pumps
Deep Well Pumps
Centrifugal Water Pumps

In fact pumps for every paper mill requirement.

160,000 pumps in successful operation.

Ask for catalog.

AMERICAN STEAM PUMP COMPANY, Battle Creek, Mich.

for some time, having started in with the Patten Company of Appleton as legal adviser, for which position he gave up his law practice.

Peshtigo Mill Engineer Electrocuted at Work

Mr. Walter E. Neuman, age 35, prominent resident of Peshtigo, was electrocuted on Thursday, April 10, while performing his duties as stationary engineer in the mill of the Peshtigo Paper Company of Peshtigo, Wisconsin. It is believed he came in contact with a grounded wire.

He is survived by his wife and two sons. A younger brother, William, met death in an auto accident between Peshtigo and Marinette a few years ago.

Foreign Correspondence

German Paper Situation

From the revolution in 1918 until the beginning of last year there was a great demand for all kinds of paper as never experienced before. Manufacturers became quite arrogant and dictated prices hitherto unheard of. The book and newspaper market was severely hit, papers went out of existence by the many hundreds, studying was much handicapped, thousands of protests were lanced against the usurious papermakers, who, by the way, put the blame on the wood producers, etc. Last year the demand diminished. From September most of the paper found its way to foreign countries, the inland business being too small. Since the middle of December, 1923, we have had stable money, the so-called gold or rentenmark, and with it the precondition for normal business, if the latter will not be spoiled in other directions by certain circumstances. Owing to the compulsory rate of exchange of the Reichsbank a disparity exists between Berlin and foreign quotations. Even the dollar is cheaper in the U. S. A. than in Germany, therefore export orders are not longer attractive. The paper industry is interested in the German gold standard and wishes to receive national gold banknotes. The dollar which had such a magic power to anybody down to children and laborers is no longer wanted this year.

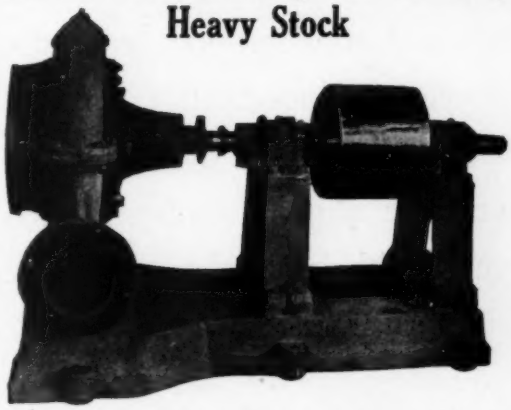
The supply of any kind of paper is very large, as has never been in the past decade. A number of daily and weekly papers, trade journals which had died in the years after the revolution revived again, new ones were and are being founded. Now credit is granted again for 2-4 weeks in the trade, while hitherto nothing was furnished except for cash. Of course since the country is impoverished and cash is very scarce sales are few and small, prices extremely low. The cheapest sorts of printed paper fetch 26-44 pfennig (6-10 cents) per kilogram, the cheapest sorts of writing paper 32-50 pfennig (7½-12 cents) per kg. In former years there were occasional periods of large supplies and cheap prices, and always some speculants were quickly on the spot who took advantage of the situation and purchased large quantities. Now the state of affairs has to be judged in a different way. What is now causing displeasant feelings is the artificially low-kept price. Unless a dealer does not find out this or that firm which goes up to 20 per cent below the convention prices, he will be powerless against his competitors who got a favorable connection.

In the years after the revolution the paper business, like any other, was more or less a speculation, while the firms are now at last able to make real calculations. But the latter are dependent on many accidental happenings. In the beginning of 1924 we are in some transition state and have to bear the consequences. To these the muddle with delivery conditions belongs. Some firms follow the terms of the convention, others make separate agreements. All endeavor to adapt the prices which for several months surpassed those on the international market to the latter. Efforts are made to cheapen freight, the cost of fuel and wood, to keep down wages and general operating expenses, at the same time to improve the quality of the finished product. Dictatory fixing of delivery and payment conditions gradually make room for free agreements.

Austria

Papermills are satisfactorily occupied, especially for foreign orders. The inland prices have recently been increased, the export prices are often higher than those on the world market. Since the German and Polish competition is nonexistent, the Austrian paper rules in whole Central Europe, finds also its way to oversea countries. On account of the favorable situation there is a demand for shares of paper concerns. The mills produced an average of 180,000 tons paper, 15,000 tons woodpulp and 120,000 tons cellulose per

8" Horizontally Split Casing Single Suction Belted Pump for Handling Heavy Stock



Built in sizes ranging from 2" to 18". 42 years designing and building centrifugal pumps for all conditions and service. Our engineering staff is ever at your service.

Please submit your specifications.

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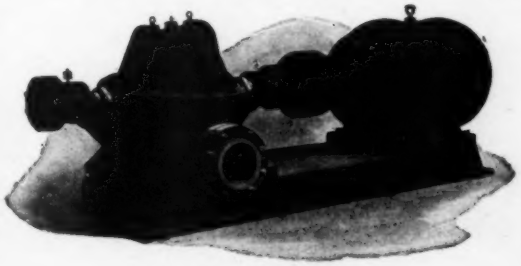
Aurora Centrifugal Pumps



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Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

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The Stickle system of removing air and condensation from the dryers, combined with the Stickle automatic control of steam, will produce a more uniform dried sheet with less steam consumed than can be done with any other equipment. We will guarantee this under a competitive test.

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"Pilot" Gate Valves

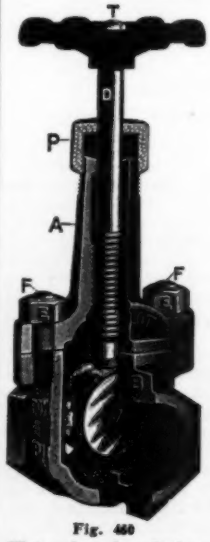


Fig. 460
Write for descriptive Circular

All iron or iron body with steam bronze trimmings. Simple in construction.

Working Pressures up to 125 lbs.

Economical and Reliable

Sizes ⅛ to 3"

Avoid disappointment in Valve Service by specifying POWELL VALVES

The Wm. Powell Co.
Cincinnati, Ohio

Hello Godfrey
Good-bye Shovels!

Why attempt to force a shovel—or a bucket—into a solid mass of coal by main strength and awkwardness, when the Godfrey System allows it to take the line of least resistance and flow freely from the car?

This equipment unloads and delivers coal and similar materials to your boiler room, outside storage or to any point within the mill at a cost of from three to seven cents a ton. One man does all the work.

Paper and pulp manufacturers are increasing their profits and decreasing their pay rolls with the **Godfrey System.** Let us tell you how you can do the same.

Ask for Bulletin A-1

Godfrey Conveyor Company
Elkhart, Indiana

Godfrey CONVEYOR

year, of which the largest part is sent abroad. Business would be even better if it was possible to supply Poland and Hungary, but with the former exports this is not possible on account of the sinking value of the Polish money and the German competition. As regards Hungary, that government has great difficulties; they are trying to establish a national paper industry there and do not need foreign imports. In former years that nation was a good customer.

Czechoslovaky

The Austrian and Czech paper mills are about alike as regards size and efficiency. But the former do the largest business with exporting finished and half-finished goods (viz., 5,500 tons, against 1,630 tons of Czech mills), while Czechoslovaky leads in exporting woodpulp and wood. If the mills were fully occupied, they would be compelled to export 60 per cent of their products, for the inland consumption is too small, but the development of the money problem of the adjoining countries do not allow such a foreign business. In the twenty cellulose factories about 120,000 tons cellulose is produced per year, about as much as in Austria. Of the total paper made at home four-fifths are consumed by the inland. The abundance of wood is the reason that so many factories for pulp, etc., have been established. There is almost an uninterrupted chain of them at the foot of the border mountains. Rags are of course little demanded. Many special machines must be procured from abroad. While in Austria a number of concerns have been formed connected together by a cartel; in Czechoslovaky a central sales organization is being formed.

Poland

The paper industry is not developed enough here for producing enough home-made paper. This and woodpulp has to be partly imported. There are at the beginning of this year about 14 larger mills in operation. On account of the small number and the use of antiquated machinery they can not cover the inland demand in the least. Export is chiefly done with wood, viz., one-half million cubic meters in 1922 and 600,000 cbm. in 1923. The production of paper was:

62,000 tons in 1913
15,000 tons in 1919
20,000 tons in 1920
31,000 tons in 1921
42,000 tons in 1922
1 ton = 1,000 kg.

A great drawback was and is the ever sinking value of the paper money. While the whole population suffers from this state, the banks flourish; they increase in number like mushrooms over night. In 1921 there were already in the small country 268 banks; last Christmas there were 587. Poland is now going to introduce stable money as at last Germany and Russia have done, but the paper money (not covered by gold) shall not be entirely withdrawn. The nation is rich in forests, which partly belong to the state and still more to private people. Since the state sells the wood dearly on the dollar basis and the intermediate traders reap big profits, besides freight and export charges are high, the export of wood has diminished. England has been the chief buyer until last year, but gets wood now cheaper in Canada or British Columbia.

Till the end of March, 1924, the custom charges for cheap paper sorts have been lowered. Now the government has resolved to increase them 75 per cent, which caused a number of protests. It would mean the death of hundreds of small newspapers and journals, besides the book market would be severely hit. In most factories several paper machines have been made idle, several firms close a few days every week. Owing to the backward equipment no paper can be manufactured exceeding 50-60 meters in length, being 1½-2½ meters wide, while Austria can make lengths of 180 meters, Germany 200 m. A single mill in German Silesia turns out with two machines over 300 vans rotation paper per month. This is double as much as the whole Polish production. At present it is cheaper to the Poles to allow their wood to travel the long way to Germany and turn it there into paper, after which it is imported into Poland again, than to make home-made paper. All national factories together can turn out one-third of the home consumption if working at full steam. The nation has 60 per cent analphabets and it is high time to place the population on a higher level of education. This requires many books and journals and there is need for much paper. The high duty will probably not survive any long period.

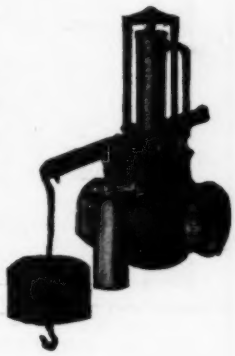
Edwin C. Spear

The treasurer of the Cheney Bigelow Wire Works, Edwin Cowles Spear, died on Friday, April 18th at Springfield, Mass. Mr. Spear leaves a host of friends in the paper industry, in which he has been closely associated for a number of years.

Getting "more" out of your present equipment

IT IS not always necessary to burn more coal in order to increase the amount of available steam.

Consider this example: Suppose your boilers are delivering their full quota of 130 lbs. steam pressure to an auxiliary or process that can be operated at 65 lbs. pressure. A Davis Pressure Regulator here will save approximately half your steam. Do you want to know more about this proved method of steam-saving? The free Davis Catalog explains it.



Write the G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago, and receive your copy.

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TRADE JENKINS MARK
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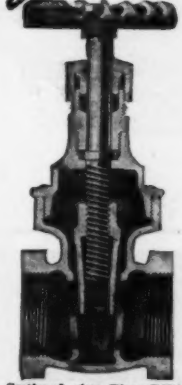

Sectional view Figure 370, Jenkins Bronze Gate Valve, Standard Pattern, stationary spindle and inside screw. Suitable for 125 lbs. steam and 175 lbs. water working pressures. Can be repacked when wide open and under pressure.

This valve can be repacked under pressure

All that is required to repack this Jenkins Gate Valve is to open the valve wide, thereby causing the rounded top of the wedge to make a steam-tight joint with the smooth finished surface of the bonnet, unscrew the packing nut, remove the follower, and then replace the packing.

The whole thing can be done while the valve is in place, on the job under full pressure.

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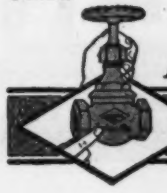
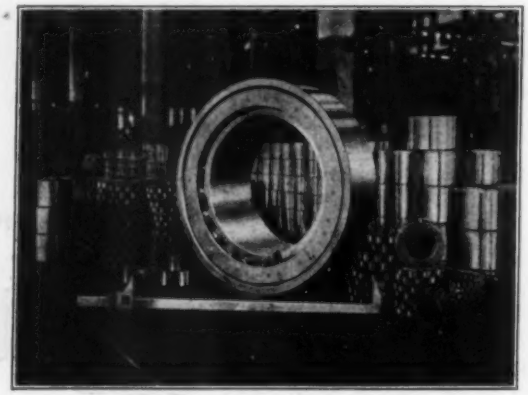


Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

THE HART BEARING



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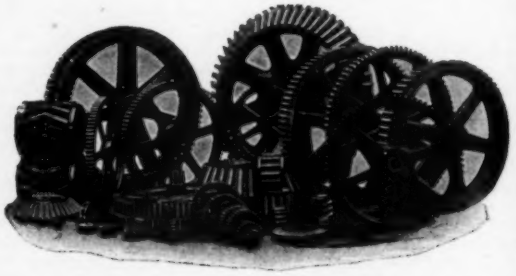

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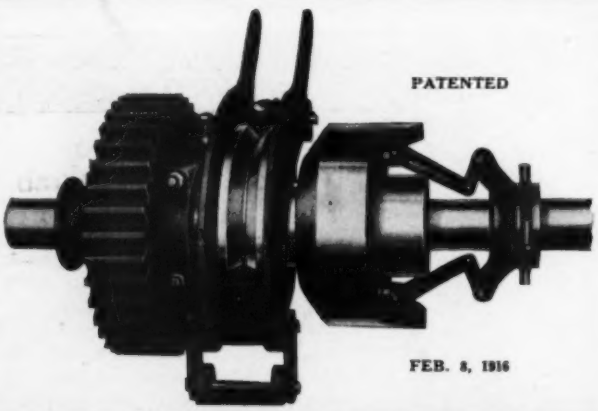

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Wholesalers to Make Trade Extension Trip

Paper distributors of Grand Rapids, Mich., are planning to join other wholesalers and distributors, aggregating sixty in number, of that city, on the trade extension trip by automobile, starting May 14, to a number of Michigan towns and cities situated in the western and northern part of the state.

The object of the trip is to become personally acquainted with their customers, in order to better understand how to serve their needs. The paper people will call on the newspaper publishers. Much enthusiasm is being elated over the idea.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of The Paper Industry, published monthly at Chicago, Illinois, for April, 1924.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward B. Fritz, who, having been duly sworn according to law, deposes and says that he is the owner and publisher of The Paper Industry, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Edward B. Fritz, 356 Monadnock Bldg.; Editor, A. Scott Dowd, 356 Monadnock Bldg.; Managing Editor, A. Scott Dowd, 356 Monadnock Bldg.; Business Manager, Edward B. Fritz, 356 Monadnock Bldg.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Edward B. Fritz, 356 Monadnock Bldg.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ..... (This information is required from daily publications only.) EDWARD B. FRITZ,

(Signature of publisher, business manager, or owner.)

Sworn to and subscribed before me this 20th day of March, 1924.

(Seal) S. J. LEHRER.

(My commission expires June 30th, 1924.)

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SEND FOR OUR BULLETIN

New York, May 1, 1924.

MANUFACTURERS and jobbers alike generally report a fairly active demand for paper. It is evident that buying has diminished to some extent in the last few weeks in contrast to earlier in the year but this is not attributed to any condition within the paper industry but is due, from all indications, solely to the slowing down of business generally in the recent past. As a matter of fact, not much complaint is registered by paper producers and dealers regarding the prevailing demand. Most of them say they are securing ample business to keep them moderately busy and to warrant production on a fairly large scale. The industry as a whole is marked by substantial activity, paper is being manufactured in volume close to normal tonnage and is moving into consuming channels in a very gratifying manner.

There is, however, considerable criticism heard concerning ruling prices, particularly of certain kinds of paper and paper board. It is a fact that prices of some descriptions of paper have eased to levels where there is little or no margin for manufacturers to realize a profit. Only one reason of any importance is behind this market condition, and that is competition. Paper producers are leaving nothing undone in an attempt to get sufficient orders to keep their mills running at capacity. They are proceeding on the theory that by cutting prices they will stimulate demand, and nearly every paper manufacturer in the country stands ready to shade quoted prices if in doing so he succeeds in weaning away orders from his competitors, especially in cases where tonnage orders are involved.

In consequence thereof, a good many paper mills are operating either at no profit at all or at a loss, and there is a loud clamor against the low prices prevailing. Obviously, this condition cannot last indefinitely. Paper manufacturers are pursuing a wrong theory, and, fortunately for the industry, many of them are beginning to realize this. Low prices are not and will not stimulate demand for paper today. The nation is in a position where it is buying what it needs—nothing more. It makes no difference if the price of an article is cheap, relatively speaking, the average consumer will not purchase unless he is in absolute need of same. The situation can be narrowed down to the paper industry. Jobbers are stocking only such supplies as they feel they require to fill the wants of customers. Consumers are using paper as their requirements develop and show no disposition at all to buy other than against direct wants. Publishers and printers and the other large users of paper, converters included, are not inclined to order ahead. The country as a whole and as regards practically all commodities is on a most conservative business scale, the banks are advising against forward purchases unless advance needs are very well defined, and most business concerns in the United States are so financially constituted at present that they are not enabled to anticipate their requirements and are not willing to do so even when their monetary condition permits because their main purpose today is to conserve ready assets and to proceed in buying in an ultra reserved manner.

Therefore the exceedingly keen competition among paper manufacturers in recent months has effected only one thing and that is the reduction of prices of paper to unprofitable levels. This does not apply to all classes of paper but it is prominently observed in some kinds of paper and board. Low prices are having just the opposite influence than is desired; it is prompting consumers to hold off in buying to as great an extent as their needs will allow. And the net result is that some branches of the paper industry are enjoying good activity insofar as business goes but are operating at no profit whatsoever.

Raw material costs today are high. About the only descriptions of raw material that are down in price are wood pulp and waste paper, all others are substantially above normal levels. Labor is very expensive, freights are high, other items of overhead are higher than ever before, despite which some kinds of paper are being marketed at surprisingly low prices. The subject of price is the one thing which is being unfavorably commented on by members of the trade, and paper manufacturers have themselves to blame for the price condition because of their efforts to keep all the mills operating at capacity when the total consuming demand does not begin to measure up to the productive capacity of the industry.

Newsprint is one class of paper which is firm in price. One of the main reasons for this is that manufacturers are maintaining quotations though, of course, demand for print paper also is an important factor in the steadiness of values, consumption of newsprint being very large and most mills being nearly sold up for some time ahead. There have been rumors of a cut of $5 a ton in the contract basis of standard newsprint to become effective July 1. These rumors have emanated only from Canadian sources and have been strongly denied by manufacturers across the border. Domestic producers declare they are not contemplating any change in the contract basis for the remainder of the year and are making contracts covering deliveries over the last six months at the same price as now prevails, namely, $75 a ton, f. o. b. mills, for standard newsprint in rolls.

A good demand exists for sheet news and there is also a steady call from transient buyers for newsprint. Publishers frequently are finding it necessary to augment their contract supplies and the spot market is quite firm. It is estimated that domestic print paper mills are running at fully 85 per cent of the capacity while newsprint mills in Canada are said to be producing at 90 per cent of maximum output.

Book paper demand is fair. If anything, there has been a slight broadening of the movement into consuming channels, reflecting the increased advertising and the larger issues publishers of fiction and trade periodicals are putting out. Prices of book paper are quotably steady; there is, however, a disposition shown by some mills to grant concessions, particularly on tonnage orders. Other manufacturers are so well fixed with orders that they are refusing to promise deliveries for a month hence at least.

The fine paper branch of the industry is moderately active. Most mills could readily take on additional business but they nevertheless are running at a fair rate of capacity and are making little paper for stock, demand keeping pace with the current production. Fine paper prices are steady and some lines tend upward owing to the high prices prevailing on rag stock.

Coarse papers are in rather slow demand and are still troubled with foreign competition. Quoted prices show little or no change but it is no secret in the trade that manufacturers are shaving prices in some cases. Tissues are in fair movement at maintained prices though the present level of market values is not all that could be desired.

Box boards are irregularly quoted and are in an easy market position. The sharp decline in raw material has greatly unsettled prices of the finished product and it is problematical at how low prices some manufacturers are selling board. Plain chip is quoted in the East at $35 a ton, f. o. b. New York and less, and plain news board at $37.50 and lower. Mills are operating on a low scale, it being estimated that board production is not better than 60 or 65 per cent of capacity.

Building papers have shown improvement in the last month after a rather slow March, and roofing and sheathing paper mills are running at good capacity.

Interesting Catalog on Board Drying

The Coe Manufacturing Co. of Painesville, Ohio, have recently published an illustrated catalog of 24 pages describing their continuous automatic roller dryer for drying boards and thick sheets which are too heavy for the regular paper machine. This bulletin takes up in detail the drying of such products as binders board, leather board, fibre wall board, insulation and plaster wall board, and copies will be sent to anyone interested.

While this machine is entirely new, installations have already been made for such firms as the Beaver Board Co., Minnesota & Ontario Paper Co., The Celotex Company, United States Gypsum Company, Niagara Gypsum Company, American Cement Plaster Company, and others."

The high temperature roller dryer requires only a fraction of the time and space of the old fashioned tunnel kilns, and offers possibilities of increased production and savings which will be of interest to many engineers.

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Domestic Raw Materials

Papermaking Rags

The market for papermaking rags is somewhat unsettled at present. There is a downward trend in prices of some classes of rags whereas others are holding fairly steady, if not firm. The situation in the different grades seems to be attributal almost entirely to the demand from consuming quarters; in fact, the proverbial law of supply and demand was probably never before so prominently in evidence as the all-important factor in a commodity market than it now is in the papermaking rag market.

Low qualities of rags are moving off in value. The chief reason for this is that demand from paper mills—notably the roofing felt plants—is rather narrow whereas supplies available to consumers have been greatly increased recently by a big jump in the importations from Europe. The better grades of old rags such as thirds and blues and white rags are about stationary in price since demand for them is running on a par with the incoming supply. New cuttings of most grades are firm and in some cases on the uptrend in price because there is no large available supply of such rags and because demand from mills is of sufficient volume at least to remove practically all the stock that is offered by dealers. Thus, it might be said, there are three separate situations existing in the rag market, due to the statistical position of the different classes of rags. Not in a long time, perhaps never before, have imports of papermaking rags into the United States been as heavy as during the past month or six weeks. Rags have been coming in from Europe by the thousands of tons, and there is no question but that the great bulk of the shipments has been roofing stock. Arrivals in recent weeks have represented purchases made back in January and February by consumers and importers when the market was very active, but despite the fact that most of the supply received lately has been sold to mills, paper manufacturers have been enabled to hold off in further buying because of receiving such large amounts from abroad. Therefore, with demand limited, prices have declined substantially and are still on the downslide. Domestic No. 1 roofing rags are selling at 2 cents a pound f. o. b. dealers' shipping points and No. 2 packing at 1.90 cents, while foreign dark cottons have eased off to where most felt paper manufacturers offer no higher than 1.75 cents a pound ex-dock New York, with reports heard of sales in exceptional cases at cheaper figures than this.

There is much consistency to the prevailing demand for old blues and whites. Writing paper mills are buying in a steady manner, as are book paper, blotting paper and fibre mills. Moreover, these rags also are moving for cotton shoddy and other similar purposes. Dealers are securing anywhere from 7 to 8 cents per pound at shipping points for No. 1 repacked whites, and special packings are bringing above these rates. No. 2 repacked whites are selling at 4.50 to 5 cents a pound, street soiled whites at 3.75 to 4 cents, and house soiled at 4 to 4.25 cents, while repacked thirds and blues are quoted on a range of 3.75 to 4.50 cents, depending on the quality of packing, and rough blues at around 3.50 cents a pound. Production of blues and whites is no better than normal, and demand is developing in a way which absorbs the offered supply readily, thereby creating a steady price tone.

Production of new cuttings is declared by dealers to be far below normal. Clothing manufacturers are said to be cutting up far less cotton goods than they usually do and that in consequence there is a limited output of cuttings. Representative dealers in numerous cases assert they are not receiving more than a third of the amount of such rags that they regard as normal, and indications point to stocks in dealers' establishments as being much smaller than they ordinarily carry. As against this condition at the supply end, paper mills are reported buying cuttings freely, which probably reflects the fairly busy position of writing paper manufacturers. There has also been some exporting of cotton cuttings, and a good demand has emanated from sources other than paper mills for certain kinds of cuttings, while in New York City a strike of clothing workers is threatened which lends a more bullish aspect to the market because if the strike occurs the production of cuttings will be further reduced.

No. 1 white shirt cuttings are quoted at 14 to 14.50 cents a pound at dealers' shipping points, fancy shirt cuttings at 7 cents, unbleached muslins at 12 cents, blue overall cuttings at 9 cents, light silesias at 8.75 cents, and washables at 5.75.

This is of course the time of the year when rag collections throughout the country usually are the heaviest. Housewives are in the midst of spring cleaning, and collectors find more rags available than during any other season. Reports are to the effect that collections are not up to normal volume this year, which appears true since the past winter was an unusually open one and collecting operations were not much disturbed by inclement weather, and since rag prices were much higher earlier in the year than now, which served as an incentive to dealers to gather supplies. Nevertheless there is no such thing as a shortage of rags, especially as regards old rags. If anything, the market is a bit topheavy with supplies of old rags at present; however, dealers argue that if prices are holding as well as they are at this period of the year there is every probability values will rise later in the year.

Average quotations f. o. b. shipping points and ex-dock New York follows:

	New York and Chicago
New Stock—	
White shirt cuttings, No. 1	14.00-15.00
White shirt cuttings, No. 2	7.00- 7.50
Fancy shirt cuttings	7.00- 7.25
Washables, No. 1	5.50- 5.75
Unbleached muslins	12.00-12.50
White lawns	11.50-12.00
Overall cuttings, blue	9.00- 9.25
Black silesias	5.50- 5.75
Light flannelettes	9.75-10.00
Canton flannels, bleached	11.75-12.00
Canton flannels, unbleached	11.25-11.50
Shoe cuttings, bleached	9.75-10.00
Shoe cuttings, unbleached	9.00- 9.25
Light silesias	8.75- 9.00
O. D. khaki cuttings	5.75- 6.00
Mixed khaki cuttings	5.25- 5.50
Corduroy cuttings	3.50- 4.00
Cottonade cuttings	4.50- 4.75
Linens, No. 1 white, foreign	16.00-17.00
Light prints, foreign	6.50- 7.00
Old Stock—	
Whites, No. 1, repacked	7.00- 8.00
Whites, No. 2, repacked	4.50- 5.00
Whites, house soiled	4.00- 4.25
Whites, street soiled	3.75- 4.00
Lace curtains	4.75- 5.00
Thirds and blues, rough	3.25- 3.75
Thirds, and blues, repacked	3.75- 4.50
Black stockings	4.00- 4.25
Cotton canvas, No. 1	4.50- 4.75
White cotton batting	4.50- 4.75
Roofing, No. 1	2.00- 2.10
Roofing, No. 2	1.85- 2.00
Dark colored cottons, foreign	1.70- 1.85
Blue linens, foreign	5.00- 5.50
Gray linens, foreign	6.00- 6.50
White linens, foreign	11.00-11.50
Light prints, foreign	4.00- 4.25

Rope and Bagging

There is still some irregularity in prices of old manila rope. The leading paper mill purchasing agency is reported buying rope at prices a good deal under the figures independent mills are granting, thereby putting quotations on a fairly wide range. Domestic manila rope in No. 1 condition is reported selling from 6.75 cents a pound f. o. b. dealers' shipping points up to 7.25 cents; in fact, there has been talk of some transactions in No. 1 rope down to 6.50 cents. However, it seems likely that most of the business current in old domestic rope is at around the 7-cent level as there is no surplus and as fresh supplies are coming in from producing sources in comparatively small lots. Foreign manila rope is quoted at 6.50 to 7 cents a pound ex-dock New York. Mixed strings are in excellent demand and paper mills are paying 1.40 to 1.50 cents per pound at shipping points.

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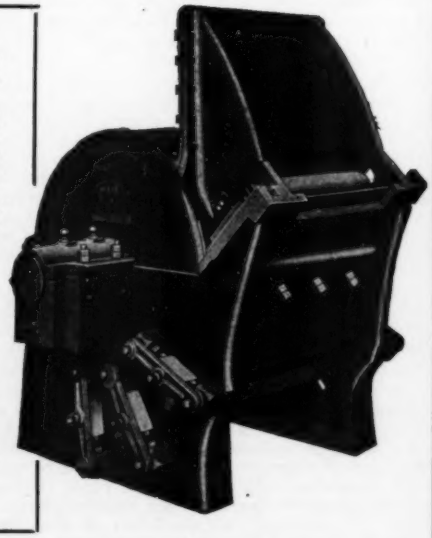

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Demand for old bagging is improved. Some of the tissue and manila mills have resumed buying on a scale approaching normal and are granting 1.50 cents and a shade higher in certain cases for No. 1 scrap bagging. Roofing bagging, on the other hand, has sagged in value and is now freely obtainable at a cent per pound at dealers' points. Old gunny bagging has firmed in price to about 1.70 cents at shipping points for domestic No. 1 gunny, and 1.60 cents for the imported article.

F. o. b. shipping point and ex-dock New York quotations are:

	New York and Chicago
Gunny, No. 1 domestic	165.-1.75
Gunny, No. 1 foreign	1.60-1.70
Scrap bagging, No. 1	1.40-1.60
Roofing bagging	1.00-1.10
Wool tares, heavy	1.60-1.75
Wool tares, light	1.50-1.60
Manila rope, No. 1, foreign	6.50-7.00
Manila rope, No. 1, domestic	6.75-7.25
Sisal strings	2.25-2.50
Mixed strings	1.40-1.50

Old Paper

Not in a lengthy period has the market for old paper been in so dull a condition. The demand for waste paper of nearly every grade is usually light and prices have steadily declined until market levels are down to a point where packers and dealers declare there is no profit whatsoever in the collection and sorting of material for mills. The reasons for this situation are difficult to define. Board and book paper mills are fairly busy, from all accounts, yet they are not absorbing anything like normal tonnages of old paper. Perhaps the pulp situation is the all-important factor as possibly consumers of waste paper are using more pulp than ordinarily; whatever is the cause there is no gainsaying that the market is in a very unsatisfactory and unhealthy state.

Quotations mean little these days because buyers are succeeding in getting nearly every grade of old paper at cheaper figures than are taken to represent market values. Shavings are quoted at 3.50 cents a pound f. o. b. shipping points for No. 1 hard white, and 2.50 cents for No. 1 soft white shavings, and sales at lower prices have been noted. Old No. 1 heavy books are selling at 1.30 cents and less f. o. b. New York, ledger stock at 1.50 cents, and old No. 1 kraft paper at 1.75 cents. Folded newspapers are available in the East at 65 cents a hundred pounds at dealers' points, and No. 1 mixed paper at 55 cents. In the West quotations on the low grades range somewhat higher than in the East but the fact that the New York market is, as one dealer expresses it, "down and out," is having a bearish influence on the situation all over the country.

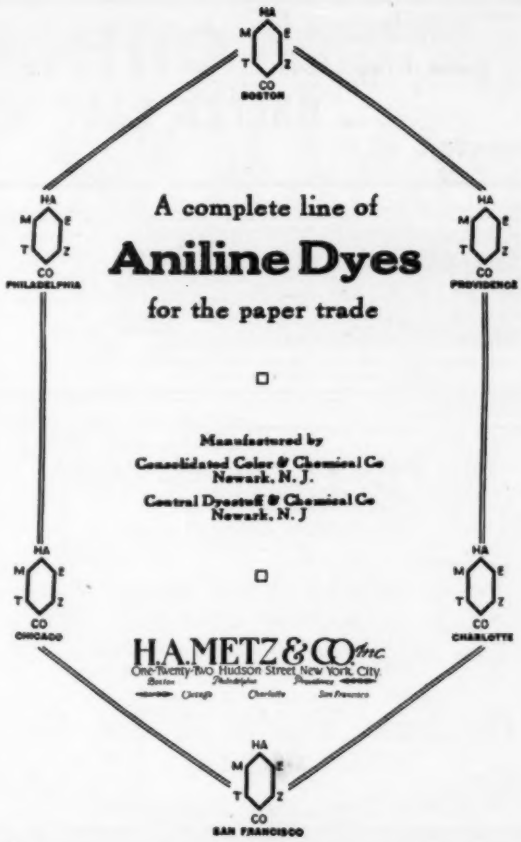
F. o. b. shipping point quotations follow:

	New York and Chicago
Hard white shavings, No. 1	3.40-3.60
Hard white shavings, No. 2	3.00-3.25
Soft white shavings	2.40-2.60
Colored shavings	1.40-1.60
Heavy book, No. 1	1.30-1.40
Crumpled book, No. 1	1.10-1.20
Ledger stock	1.50-1.65
Kraft, No. 1	1.75-1.85
Manilas, No. 1	.80-1.00
White blank news	1.70-1.80
Over-issue news, No. 1	.80-1.00
Folded news	.65- .85
Mill wrappings	.70- .80
Mixed paper, No. 1	.55- .70
Common paper	.45- .55

Chemical Pulp

While little or no material improvement can be noted in the domestic wood pulp situation, it is clearly evident that sentimentally at least the tone of the market is somewhat steadier. Producers seem less desirous to make sales at the prices consumers are inclined to bid, and in certain cases pulp manufacturers are closing down their plants rather than continue to market their product at what they declare are losing prices. There appears to be little opportunity afforded the market to actually improve, however, for the reason that most paper and board manufacturers are looking more to foreign than to domestic pulps to fill their requirements, thus keeping demand for the home product on a small scale.

Probably the most important development in regard to prices is the reduction of $5 a ton recently announced by one of the foremost domestic manufacturers of bleached sulphite. The price now named is 3.75 cents a pound f. o. b. pulp mill on this concern's most popular brand of bleached sulphite,



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with the better grade quoted at 4 cents and the extra quality at 4.25 cents. Since this cut in price the bleached sulphite position has become slightly more active, which is probably also due in part to the strike of pulp mill workers in Norway and the resultant drop in production of bleached pulp in that country.

Unbleached sulphite is quoted from 2.50 cents and possibly slightly less per found f. o. b. pulp mills for news grade up to 2.90 cents for the better qualities of such pulp. Bleached soda pulp is quoted around 3.50 cents a pound at pulp mills, and kraft of No. 1 grade at 2.60 to 3 cents a pound.

F. o. b. pulp mill quotations are as follows:

Bleached sulphite	3.75-4.25
Easy bleaching sulphite	2.75-3.00
Unbleached sulphite, No. 1	2.60-2.90
News grade sulphite	2.40-2.65
Soda pulp, bleached	3.50-3.75
Mitscherlich, unbleached	3.00-3.25
Kraft, No. 1	2.60-3.00
Screenings, refined	1.50-1.75

Mechanical Pulp

Current demand for ground wood is not poor; in fact, it is fairly voluminous. Producers and dealers alike report they are making sales of satisfactory tonnage and that consumers are purchasing with a regularity that is gratifying. This is the season, however, when production of mechanical pulp is close to the topnotch as grinders have plenty of water to run their plants and generally aim to store up a surplus of pulp to last them during the summer drouth period. According to reports though, not much ground wood is being stored up at present. Domestic manufacturers are said to be themselves using practically all the pulp they are making and therefore have less than usual tonnage to direct to the open market, and transient buyers are mostly finding it necessary to go to Canada to secure the pulp wanted.

Quotations range from $27 a ton upwards f. o. b. grinding mills, depending on the moisture test and the freight to consuming points. As high as $33 and $34 is reported quoted in some quarters, but it appears unlikely that many consumers are granting such figures. Not much ground wood is coming into the country from Scandinavia, owing principally to the pulp mill strike in Norway and also to the higher prices prevailing there, and importers in New York say they must obtain around $33 a ton ex dock at that port to realize a profit on foreign ground wood.

Chemicals

Most papermaking chemicals are moving in a regular manner and in fairly large amounts toward consuming mills, though it is apparent the movement is chiefly against contracts. Some changes in quoted prices are noted, principally in a downward direction. Casein has eased slightly to where 10 cents a pound is about the ruling quotation, duty paid on the foreign article. Bleaching powder is quoted at 1.75 cents and up to 2 cents a pound at works, yet most consumers are getting needed supplies on old contracts at much lower prices, so low, in fact, that producers maintain they are working at a heavy loss. Soda ash is steady at around 1.40 cents per pound, and caustic soda is quoted at 3 to 3.25 cents a pound.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc, fixe, powdered	4.00- 4.25
Bleaching powder	1.75- 2.00
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	10.00-11.00
Caustic soda, spot delivery	3.00- 3.25
China clay, domestic washed	12.00-15.00
China clay, foreign	15.00-20.00
Rosin, grade E	5.75- 5.85
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	1.35- 1.50
Starch, papermakers', in bags	3.40- 3.70
Talc (ton)	14.00-16.00

Mr. P. H. Baker, President of the Seaman Paper Company of Missouri, with headquarters at St. Louis since its inception in 1920, has resigned, effective May 1st, 1924. Mr. S. M. Tobey of the Chicago Office has been elected to succeed Mr. Baker as President.

Gatti Paper Stock Corporation has removed its New York offices from 200 Fifth Avenue to more commodious and convenient quarters in the Liggett Building, Rooms 805-806, 41 East 42nd Street, corner of Madison Avenue, New York City.

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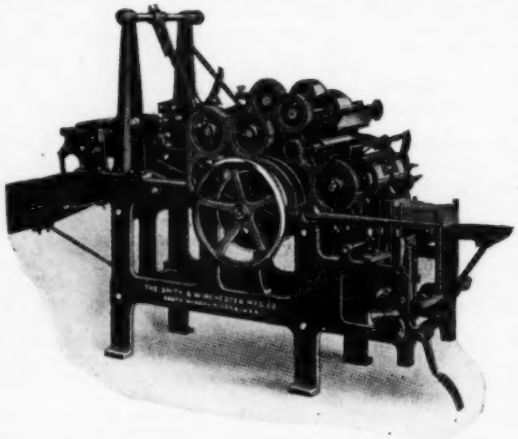
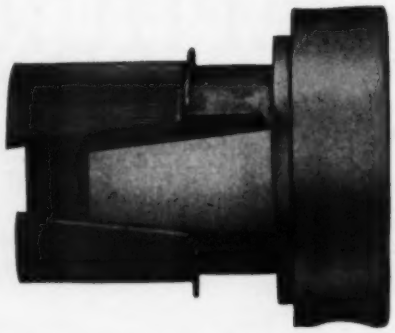


Paper Bag Making Machinery

CHUCK PERFECTED FOR PAPER CORES



One disadvantage in the use of paper cores which heretofore existed was that no chuck would hold the roll from slipping without damaging the paper thereon has been overcome by the use of the Oneida Chuck. The Oneida Chuck fastens itself to the core in such a way that the roll cannot slip on the spindle.

Just One of the Many Advantages

The Oneida Chuck allows the use of Spiral or Straight wound Paper Cores, eliminates the big item of freight and drayage on heavy iron or heavy metal tipped cores from and back to the mill.

For further information address

THE ONEIDA CHUCK CO., Rhinelander, Wis.

"SONOCO" TUBES

FIBER CORES AND CENTERS FOR ALL PURPOSES

True-Round, Equal Wall-Thickness, Cut Accurately and Cleanly

Special Types

for unusual manufacturing requirements made to order, if not in stock. We have unusual facilities for making tubes of all sizes—from smallest to largest.

Send us Samples or Specifications for Quotation:

SONOCO PRODUCTS CO., MFR.

HARTSVILLE, S. C.

New Papers

Writing—	
White rag	20.45
White sulphite	11-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	13-30
Colored sulphite	40-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	9-30
Colored sulphite	10-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	6.25- 7.00
Machine finished	6.00- 6.75
English finished	6.25- 7.00
Coated and enameled	8.00-12.00
Lithographed, M. F.	9.00-14.00
Newsprint—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.75
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.75- .85
No. 2 white, 24-36	.70- .75
No. 1 manila, 24-36	.70- .75
Kraft	1.00- 1.25
Wrapping—	
No. 1 Kraft	6.00- 6.75
No. 2 Kraft	5.25- 5.50
Boards—	New York and Chicago
Solid news	40.00-45.00
Straw	50.00-55.00
Plain chip	35.00-37.50
White coated chip	55.00-60.00
Manila coated chip	50.00-55.00
Binder's board	70.00-75.00

$50,000 for Southern Forestry

The South will have one of the largest forest experiment stations if a bill just passed by the Senate is accepted by the House of Representatives and the President, announces the American Forestry Association. The bill, known as S. 824, was introduced by Senator Fletcher, of Florida, and appropriates $50,000 for a forest experiment station in the southern pine region. The bill has been approved by the Director of the Budget as not being contrary to the financial policy of the administration. Introduced in the House of Representatives, it is awaiting action by the Appropriations Committee.

The Secretary of Agriculture, at the request of the Senate, reported the department's views of the proposed station. "The original pine forests of the South Atlantic and Gulf States," he said, "covered from 125 to 130 million acres and had a stand of timber close to 650,000,000,000 feet. Four-fifths of this stand has been cut since 1870, and chiefly since 1890. Moreover, the cutting has been done in such a way that 31 million acres, or more than one-fourth of the present pine area of the region, is wholly unproductive and an additional 60 million acres only partially productive. As a result, the total cut of southern yellow pine is about three times the annual growth, while in the case of saw timber alone the present cut is more than four times the annual growth.

"These facts mean that the production of southern yellow pine, which for more than 20 years has dominated the cut of softwood timber in this country, can not be maintained indefinitely. . . .

"It is thus evident that the present timber situation in the South is a serious one not only from the standpoint of the South itself, but of practically the entire country. Under present methods of exploitation one of our most valuable natural resources is being utilized, with little or no provisions for its replacement. Such second growth as follows lumbering is a matter of chance and is deficient in both quantity and quality. Unless active steps are taken to handle the forest lands of the South in such a way as not only to maintain but to increase their productivity, the effects will be felt in a growing scarcity of lumber and correspondingly increased prices throughout the United States east of the Rocky mountains.

"To determine what measures should be taken to produce the greatest amount of the most desirable species in the shortest possible time under the widely varying climatic and soil conditions found in various parts of the South requires constant and extensive investigation on the part of thoroughly trained men. Experience has shown that such investigations can be conducted to best advantage from a forest experiment station similar in general character, purpose and scope to the agricultural experiment stations of the country."

Planning for Big Graphic Arts Show

Harvey H. Weber, president of the International Association of Printing House Craftsmen, has written a message urging all members to get back of the Annual Convention and great Graphic Arts Exposition to be held in Milwaukee August 18 to 23.

Mr. Weber's message is in part as follows:

Our Major Activity

"An ideal is the mental image of a thing desired—something not yet realized, or only in part realized.

"The Craftsmen have an ideal in harmony with the spirit of eternal progression that makes for the betterment of our crafts and the upbuilding of men.

"Our organization makes a strong appeal to men big enough to know that a clear recognition of duties is more important than blind striving for rights, and that to function efficiently they must co-operate with their fellows; that they must contribute to the extent of their ability in thought, word and deed; that every man should dignify and be dignified by his work.

"To develop the Craftsman Ideal our technical knowledge must be better systematized and more widely diffused and a fraternal spirit must characterize our every activity.

"Our 1924 activities center around our Annual Convention and the great educational Graphic Arts Exposition, to be held in Milwaukee, August 18 to 23. The Milwaukee Club is working at a peak energy, and while the big enterprise is not yet complete, its success is assured. Present accomplishments, together with further definite and practical constructive work now under way, will contribute much to the solid and permanent structure of our International Association. The financial gain will be placed in the hands of the International to be used for strictly educational purposes, so that every member in the International jurisdiction is vitally interested in making this the largest and most complete Exposition ever organized."

Discover New Wood for Paper Making

Wood from the ailanthus, otherwise known as the tree of heaven, which was imported from China into Pennsylvania and New York and is rapidly becoming a weed and a menace in those states, has been discovered by the U. S. Forest Products Laboratory here to be an excellent pulpwood. A half cord of ailanthus wood, sent by the Pennsylvania state department of forestry to the laboratory with the hope of finding some use for it, was made on the experimental paper machine into a good grade of book paper.

The wood, which is pulped by the soda process, gives a high yield of pulp. Since it bleaches very easily, the product can be used in the manufacture of book, lithograph, and writing paper.

The growth of the ailanthus tree is rapid. In New Zealand the ailanthus is said to produce 25 tons of wood to the acre every three years.

The B Quality Pulps

"HAFSLUND BEAR"
Bleached Sulphite

"FORSHAGA"
Bleached Sulphite

"HURUM SPECIAL"
Extra Strong Kraft

KOOS BAC

"BAMBLE"
Extra Strong Kraft

The Borregaard Company
200 Fifth Ave. Incorporated New York, N.Y.

E. J. KELLER COMPANY
INCORPORATED
200 FIFTH AVENUE
NEW YORK

FOREIGN AND DOMESTIC

PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
COTTON, JUTE AND FLAX WASTES
EAST INDIA MERCHANDISE

BRANCH OFFICE
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STOCKHOLM
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Agents
A/S TOTEN CELLULOSEFABRIK
Bleached Sulphite

A/S GULSKOGEN
CELLULOSEFABRIK
Easy Bleaching
Sulphite

PERKINS-GOODWIN CO.
NEW YORK
PULP and PAPER

Agents
SUND AKTIEBOLAG
Strong Unbleached Sulphite
(Indirect Cooking)

EXPORTS

Export of paper from the United States in February, 1924, amounted in value to $2,045,961, a decrease of $5,623 compared with the preceding month but an increase of $86,370 compared with February, 1923. The chief gains were in exports of paper board and straw board, which increased in value 21 per cent compared with January and 57 per cent compared with February last year, and in exports of hanging paper, which increased 46 per cent compared with January and 82 per cent compared with a year ago. Shipments of carbon paper, envelopes, wrapping papers (other than kraft), and toilet paper during February also showed considerable gains over both the preceding month and last year, while exports of greaseproof and waterproof papers, news print, towels and napkins, and sheathing and building papers, although somewhat under those for January still showed a substantial increase over February last year.

The quantity and value of the total paper exports for the United States, and also of the principal classes, for the three months noted are shown in the following table:

Item	February, 1923 Pounds	Value	January, 1924 Pounds	Value	February, 1924 Pounds	Value
Newsprint	2,387,194	$ 121,280	3,364,348	$ 181,754	2,813,072	$ 149,740
Book paper, not coated	2,379,421	261,389	1,370,430	151,648	929,384	113,069
Wrapping paper (not including kraft)	2,306,421	169,783	1,755,577	150,113	1,921,619	174,241
Paper board and straw board	3,441,569	177,809	5,704,224	236,732	6,532,770	287,940
Photographic	88,601	104,125	126,460	129,943	102,356	101,292
Hanging (yards)	2,329,461	58,583	2,865,890	73,318	4,018,225	106,796
Boxes and cartons	765,664	75,761	908,950	81,744	929,853	80,521
Playing cards (packs)	1,041,162	107,336	367,110	54,225	891,985	78,491
All other		883,525		992,107		953,871
Total		$1,959,591		$2,051,584		$2,045,961

IMPORTS

Wood Pulp

There is no doubting that the tone of the wood pulp markets abroad is firming. Reports almost without variation tell of manufacturers in Scandinavian countries quoting in a steadier way and holding for the rates named with much more firmness, reflecting the fact that most pulp mills in Sweden and Norway are fairly well sold for the present year, and presumably indicating that foreign producers are attempting to put pulp prices back to levels where profit may be realized in manufacturing this commodity under ruling conditions.

As an instance of the upward tendency of prices abroad, Swedish manufacturers are reported to have agreed on a new minimum price for kraft pulp of 2.60 cents a pound landed New York or other American ports, effective on June 3. This price represents an advance of $2 a ton from the prevailing minimum price on Swedish kraft pulp and at which the bulk of sales made for export to the United States have been made in the last several months. Pulp prices in Norway also are tending to firm, owing to the strike of pulp mill workers in that country and the consequent decrease in production. Late advices indicate to what extent the pulp industry in Norway is affected by the labor disturbances, the figures given showing that current production of mechanical pulp is down to only about 400 tons daily, against a normal output of 1,300 tons per day, and bleached sulphite production is but 50 tons a day, compared with a normal of 430 tons, while unbleached sulphite mills, with an estimated normal daily capacity of 375 tons, are entirely shut.

The spot situation in imported pulp in New York is somewhat steadier. Importers as a rule ask 2.60 and 2.65 cents a pound ex dock or warehouse for No. 1 kraft, and sales at such figures have been made. Spot stocks of kraft are small, doubtless smaller than are usually carried, and stocks of sulphite also seem to be on the decline. However, price concessions are being granted by sellers on unbleached sulphite. Strong unbleached is selling at 2.50 cents ex dock New York and in exceptional cases at slightly less though higher prices also are quoted. Bleached sulphite of No. 1 grade is quoted from about 3.75 cents up to 4.15 and 4.25 cents a pound ex dock New York.

First open water shipments from Sweden are expected to begin toward the end of this month, and importers say it will likely be the first week of June before arrivals can be looked for at U. S. ports owing to the lateness of the season abroad due to the severe winter in Northern Europe this year. In the meantime it is felt by some of those on the selling side of the trade that spot prices may strengthen, but the position of values in the near future depends on the demand from consuming quarters. It is commonly conceded that purchases by American paper and board manufacturers of Swedish pulp for forward shipment have been heavy and it is therefore expected spring shipments this year will be large.

Receipts at the port of New York in April and current market quotations ex dock New York follow:

Bleached sulphite, No. 1	$3.75- 4.25
Unbleached sulphite, No. 1	2.50- 3.00
Easy bleaching	2.75- 3.00
Mitscherlich unbleached	2.80- 3.00
Kraft	2.50- 2.75
Ground wood, per ton	32.00-35.00

Johaneson, Wales & Sparre, 1,403 bls. from Copenhagen and 2,480 bls. from Gothenburg; E. M. Sergeant Co., 762 bls. from Copenhagen, 1,210 bls. from Gothenburg, 320 bls. from Christiania and 3,002 bls. from Trieste; E. Naumberg & Co., 3,601 bls. from Trieste and 500 bls. from Hamburg; Hartig Pulp Co., 2 bls. from Gothenburg and 288 bls. from Rotterdam; Castle & Overton, 250 bls. from Gothenburg, 382 bls. from Rotterdam and 1,235 bls. from Bremen; E. J. Keller Co., 499 bls. from Rotterdam, 1,350 bls. from Trieste and 1,500 bls. from Bremen; Hudson Trading Co., 375 bls. from Gothenburg; Buck, Kaier & Co., 150 bls. from Copenhagen and 192 bls. from Hamburg; Scandinavian Pulp Agency, 167 bls. from Gothenburg; Pagel, Horton & Co., 2,500 bls. from Gothenburg; Tidewater Paper Mills Co., 24,807 bls. ground wood from Liverpool, N. S.; Guaranty Trust Co., 900 bls. from Trieste, 7,790 bls. from Christiania and 375 bls. from Gothenburg; Mechanics & Metals National Bank, 3,000 bls. from Christiania; Goldman, Sachs & Co., 1,500 bls. from Bremen; New York Trust Co., 505 bls. from Trieste; Bank of New York & Trust Co., 2,336 bls. from Trieste; Order, 325 bls. from Gothenburg and 1,000 bls. from Trieste.

Paper Stock

Continued heavy arrivals of rags featured importations of papermaking raw materials into the United States in April. Receipts of rags were exceptionally large, probably a new high record of a single month's importations was established; certainly imports were close to a record, judging from the number and size of shipments landed at the port of New York. Arrivals of other materials during the month were of fair volume, some good amounts of old rope, bagging and waste paper being received. Imports of papermaking material of all kinds through the port of New York in April, with names of consignees, as follows:

Old Rope

Brown Bros. & Co., 42 coils from Christiania, 275 coils and 217 bls. from Antwerp, 655 coils and 504 bls. from Bristol, 119 bls. and 421 coils from Rotterdam, 43 bls. and 58 coils from Hull, 592 coils from Newcastle, 176 bls. from St. Nazaire, 99 coils and 135 bls. from Hamburg, 54 coils from Leith and 25 coils from Bremen; E. J. Keller Co., 51 bls. from Havre, 141 bls. from Trieste, 102 bls. and 154 coils from Rotterdam, 239 coils from Copenhagen and 44 bls. from Hamburg; N. E. Berzen, 11 bls. from Havana; T. D. Downing & Co., 69 bls. from Halifax; W. Schall & Co., 40 bls. from Barcelona; Mechanics & Metals National Bank, 20 bls.

J. ANDERSEN & CO.
21 East 40th Street, New York City

Importers of Chemical Pulps
BLEACHED AND UNBLEACHED

Agents for Kellner Partington Paper Pulp Co., Ltd.
Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden

The Pulp and Paper Trading Co.
21 East 40th Street New York City

DEALERS IN DOMESTIC CHEMICAL AND MECHANICAL PULPS AND PAPER

AGENTS FOR
J. & J. Rogers Company, Ausable Forks, N. Y.
E. B. Eddy Company, Ltd., Hull, Canada

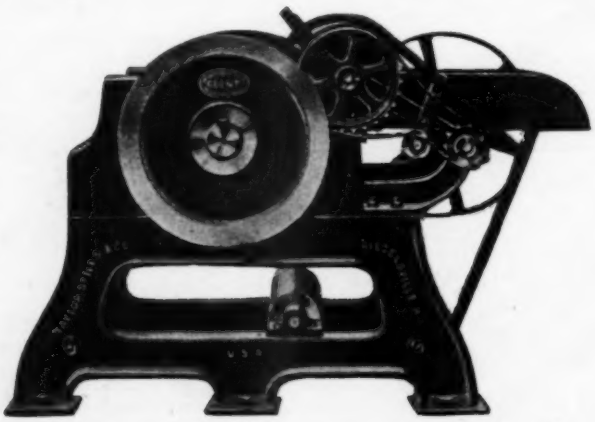
Canadian Kraft Limited, Three Rivers, Canada
Dealers in Wayagamack Kraft Pulp

Howard Smith Paper Mills, Montreal, Quebec
EASTERN AGENTS of Sulphite Pulp. Made by
Port Huron Sulphite & Paper Co., Port Huron, Mich.

RESILIENT RUBBER ROLLS

It is the "resilient cushion" and not the softness of the roll that takes the water out and gives maximum felt economy at the same time.

Made by STOWE & WOODWARD COMPANY
The Rubber Roll Makers
NEWTON UPPER FALLS, MASS., U. S. A.



RAG CUTTERS

Whatever You Cut, a GIANT Will Solve Your Problem

LET US FIGURE IT OUT FOR YOU

Taylor, Stiles & Co., Riegelsville, N. J., U.S.A.

WATEROUS ENGINE WORKS
Brantford, Ont., Canada
Canadian Representatives

R. J. MARX
133 Finsbury Pavement, London E. C.
Sole Agents for Europe

from Southampton; Irving Bank-Columbia Trust Co., 164 bls. from Havre; Levinson & Co., 27 coils from Rotterdam; Anglo-South American Trust Co., 57 coils from Antwerp; Ellerman's Wilson S. S. Line, 290 coils from London and 40 coils and 21 bls. from Hull; George W. Millar & Co., 35 bls. from Bremen; Katzenstein & Keene, 139 coils from London; North German Lloyd, 85 bls. from Bremen; Guaranty Trust Co., 25 bls. from London; Order, 18 coils from London.

Old Bagging

G. M. Graves Co., 50 bls. from Glasgow; Kidder-Peabody Acceptance Corp., 151 bls. from Havre; Bank of New York & Trust Co., 83 bls. from Barcelona; E. J. Keller Co., 147 bls. from Barcelona, 215 bls. from Hamburg, 77 bls. from Havre, 473 bls. from Rotterdam and 292 bls. from Manchester; Prince & Kennedy, 71 bls. from Dublin; Coal & Iron National Bank, 77 bls. from Havre; Guaranty Trust Co., 17 bls. from Manchester; J. A. Manning Paper Co., 64 bls. from Manchester; Equitable Trust Co., 84 bls. from Manchester, 39 bls. from Havre and 42 bls. from Antwerp; A. H. Searle, 204 bls. from Glasgow; S. Birkenstein & Sons, 74 bls. from Rotterdam; E. Butterworth & Co., 163 bls. from Rotterdam; Baring Bros. & Co., 160 bls. from Manchester; Order, 144 bls. from Manchester, 262 bls. from Antwerp, 11 bls. from Hamburg and 113 bls. from Liverpool.

Rags

Castle & Overton, 67 bls. from Antwerp and 61 from Rotterdam; Stone Bros. & Victor Galaup Co., 22 bls. from Liverpool, 125 from St. Nazaire, 705 from Havre and 2 from Bordeaux; Katzenstein & Keene, 344 bls. from Valencia, 248 from Barcelona, 109 from Havre, 157 from St. Nazaire and 334 from London; E. J. Keller Co., 85 bls. from Dunkirk, 856 from Hamburg, 475 from Havre, 300 from Kobe, 559 from Trieste, 2,105 from Antwerp, 789 from Copenhagen, 2,356 from Rotterdam, 345 from Leghorn, 190 from Bremen and 199 from St. Nazaire; E. Butterworth & Co., 78 bls. from Belfast and 47 from Rotterdam; Waste Material Trading Corp., 10 bls. from Hull and 109 from Leith; Whaling Waste Product Co., 338 bls. from Hull, 201 from Rotterdam and 38 from Hamburg; Robert Blank, 42 bls. from Bremen; M. Wolfer & Co., 17 bls. from Havana; S. Birkenstein & Sons, 497 bls. from Havre and 98 from Rotterdam; Paul Berlowitz, 408 bls. from Havre, 401 from St. Nazaire and 338 from Rotterdam; Atterbury Bros., 110 bls. from St. Nazaire; Daniel M. Hicks, Inc., 143 bls. from Rotterdam, 101 from Havre and 35 from Manchester; Isaac Minsky, 41 bls. from Rotterdam; Maurice O'Meara Co., 71 bls. from Rotterdam; G. M. Graves Co., 172 bls. from Rotterdam; Guaranty Trust Co., 705 bls. from Havre, 297 from Manchester, 343 from Antwerp, 151 from Naples, 111 from Glasgow, 494 from Bristol, 1,716 from Hamburg, 288 from Leghorn, 144 from Liverpool, 308 from Bremen, 112 from Rotterdam, and 111 from Genoa; Equitable Trust Co., 51 bls. from Havre, 49 from Manchester and 699 from Barcelona; New York Trust Co., 120 bls. from Manchester, 87 from Glasgow, 301 from Newcastle, 276 from Bristol, 91 from Havre and 134 from London; Anglo-South American Trust Co., 20 bls. from Manchester, 24 from Liverpool and 16 from Bristol; Goldman, Sachs & Co., 972 bls. from Havre, 318 from Marseilles, 123 from Antwerp, 155 from St. Nazaire and 198 from Copenhagen; National City Bank, 66 bls. from Antwerp, 12 from London, 133 from Copenhagen, 47 from Glasgow, 35 from Rotterdam and 137 from Bristol; First National Bank of Boston, 25 bls. from Antwerp; International Acceptance Bank, 162 bls. from Antwerp, 305 from London and 246 from Glasgow; Strupp & Co., 128 bls. from Hamburg; Brown Bros & Co., 1,232 bls. from Antwerp, 109 from Newcastle and 200 from Marseilles; A. W. Fenton, Inc., 68 bls. from Antwerp, 1,176 from Rotterdam, 81 from London and 42 from Hamburg; F. P. Gaskell & Co., 35 bls. from Glasgow; North German Lloyd, 550 bls. from Bremen; Kidder-Peabody Acceptance Corp., 344 bls. from Havre; E. W. Dutton, Inc., 85 bls. from Havre; Philadelphia National Bank, 413 bls. from Leghorn; State Bank, 200 bls. from Leghorn and 117 from Bremen; Coal & Iron National Bank, 139 bls. from Marseilles, 16 from Glasgow, 414 from Dublin and 136 from Hamburg; Mechanics & Metals National Bank, 227 bls. from Glasgow, 164 from Manchester, 52 from Hamburg, 83 from Havre and 126 from Bremen; American Exchange National Bank, 91 bls. from Hamburg, 583 from Bremen, 157 from Leith and 195 from Bristol; Union National Bank of Philadelphia, 110 bls. from Hamburg; Chase National Bank, 114 bls. from Glasgow, 73 from Antwerp, 272 from Bremen, 58 from Hamburg and 11 from London; Bankers Trust Co., 73 bls. from Marseilles; First National Bank of Boston, 44 bls. from Antwerp; Flintkote Co., 116 bls. from Hamburg; American Express Co., 198 bls. from Hamburg; Ropex Co., 128 bls. from Antwerp; Manufacturers Trust Co., 90 bls. from Rotterdam; Leshner Paper Stock Co., 332 bls. from

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The survival of the fittest

The easiest way to survive competition is to reduce the cost of production.

Our equipment will help you to do this:

Jenssen Acid Towers
Jenssen Spray Coolers
Bullard Gas Washer
Decker Cooking Process
Kamyr Feltless Wet Machine

G. D. Jenssen Co.

200 Fifth Ave., New York City

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

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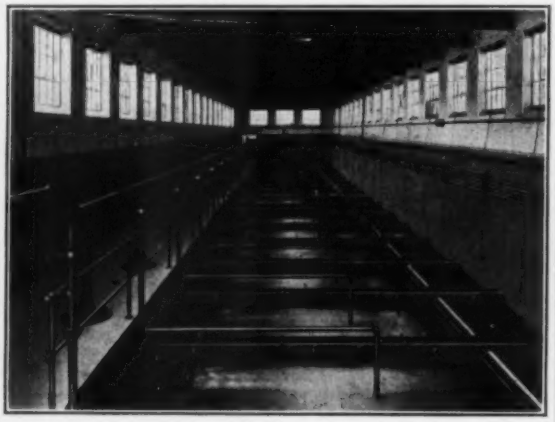

Clean Water
Low Maintenance Cost
Reliable

NORWOOD ENGINEERING CO.
FLORENCE, MASS., U. S. A.

Notice the heavy ship channels, pressed steel tire and gear saddles securely riveted to the channel sections and the substantial construction of the tires and gears in this Paulson Barking Drum. Is it any wonder that they stand the test? If interested in barking drums now, write us. You'll be satisfied with a Paulson drum.

MANITOWOC ENGINEERING WORKS

"Digester Makers Since "91"
Manitowoc, Wisconsin

Havre; Salomon Bros. & Co., 81 bls. from Havre; R. Bishop Mfg. Co., 304 bls. from Dunkirk; Darmstadt, Scott & Courtney, 43 bls. from Hamburg; William Hughes & Co., 29 bls. from Hamburg; Kelly & Co., 49 bls. from Hamburg; R. F. Downing & Co., 53 bls. from Manchester; Order, 144 bls. from Manchester, 642 from Antwerp, 176 from Liverpool, 397 from Venice, 882 from Leghorn, 175 from Oran, 327 from Glasgow, 50 from Barcelona, 812 from London, 219 from Bordeaux, 17 from Palermo, 140 from Buenos Aires, 63 from Newcastle, 1,543 from Hamburg, 237 from Swansea, 27 from Havre, 86 from Rotterdam and 71 from Calcutta.

Miscellaneous Paper Stock

Daniel M. Hicks, Inc., 27 bls. from Dunkirk; Equitable Trust Co., 210 bls. from Antwerp; S. Birkenstein & Sons, 193 bls. from Rotterdam; Chase National Bank, 33 bls. from Dundee; Hughes-Fawcett Co., 36 bls. from Antwerp; Katzenstein & Keene, 192 bls. from Barcelona; Salomon Bros. & Co., 5 bls. from Dunkirk; Mechanics & Metals National Bank, 71 bls. from Belfast and 197 from Liverpool; E. J. Keller Co., 458 bls. from Antwerp, 91 from Hamburg, 76 from Rotterdam, 51 from Algiers, 147 from Barcelona and 99 from Trieste; Guaranty Trust Co., 85 bls. from Dunkirk, 73 from Venice, 43 from Genoa and 40 from Antwerp; Brown Bros. & Co., 72 bls. from Glasgow and 65 from Bristol; W. Schall & Co., 128 bls. from Antwerp; Order, 89 bls. from Antwerp, 82 from Liverpool, 175 from Venice and 174 from Glasgow.

Paper

There was no especial feature to importations of paper into the United States during April. Receipts of wrapping paper were somewhat smaller than in the several previous months but there were nevertheless some big shipments of this class of paper received in April. News print imports were of fair volume, while normal amounts of cigarette, hanging, filter, drawing and other kinds of paper arrived. Imports of paper of all kinds through the port of New York in April follow:

Cigarette

American Tobacco Co., 2,100 cs.; R. J. Reynolds Tobacco Co., 2,020 cs.; National City Bank, 5 cs.; P. J. Schweitzer, 226 cs.; Standard Products Corp., 96 cs.; E. Waters, 5 cs.; M. Spiegel & Sons, 24 cs. and 31 bls.; DeManduit Paper Corp., 376 cs.; S. Alexandre, 5 cs.; A. D. Sabin, 7 cs.; Mallory Line, 3 cs.; Southern Pacific Co., 3 cs.; Surbrug Co., 14 cs.; Order, 59 cs. and 94 rolls.

Printing

B. F. Drakenfeld & Co., 114 cs.; Perry, Ryer & Co., 331 cs.; Keuffel & Esser Co., 24 rolls; C. Steiner, 31 cs.; Draeger Shipping Co., 6 rolls; C. B. Richard & Co., 68 cs.; Martin & Bechtold, 20 cs.; Falsing Paper Co., 19 cs. and 54 rolls; F. G. Prager & Co., 249 rolls; Street & Smith Publishing Co., 1,127 rolls; Hudson Trading Co., 360 rolls; Seaman Paper Co., 186 rolls; Tradesmen's National Bank, 12 cs.; Chemical National Bank, 597 rolls; J. P. Heffernan Paper Co., 9 pkgs., 130 bls. and 108 rolls; International Acceptance Bank, 2,278 rolls; C. G. Keferstein, 5 cs. and 547 rolls; Leonhart, Moritz & Co., 381 rolls; Irving Bank-Columbia Trust Co., 103 rolls and 62 bls.; Young Publishing Co., 98 rolls; Dell Publishing Co., 22 rolls; W. Hartmann & Co., 88 rolls; Corn Exchange National Bank of Philadelphia, 45 cs.; A. Vuyck, 4 rolls; C. K. MacAlpine & Co., 4 bls.; Oxford University Press, 5 cs.; P. C. Zuhlke, 72 cs.; Pulp and Paper Trading Co., 206 bls.; Equitable Trust Co., 22 rolls; Traders Paper Co., 1,273 rolls; F. & R. Trading Co., 364 rolls; R. Wilson Paper Corp., 58 cs. and 13 rolls; Fourth & First National Bank, 144 rolls; New York & Hauseatic Corp., 152 rolls; Import Paper Co., 183 bls.; International Forwarding Co., 35 cs.; E. H. Bailey & Co., 40 cs.; Order, 3,126 rolls.

Wrapping

G. W. Sheldon & Co., 49 bls.; Baldwin Universal Co., 10 cs.; International Acceptance Bank, 294 rolls and 9 bls.; Maurice O'Meara Co., 224 bls.; Corn Exchange Bank, 1,287 bls. and 3,885 rolls; New York Trust Co., 1,390 bls.; Republic Bag & Paper Co., 1,860 rolls and 49 bls.; Chemical National Bank, 309 bls.; Chase National Bank, 12 bls.; M. M. Cohen, 175 bls. and 24 rolls; Gibson Bros. & Co., 814 rolls; Steiner Paper Corp., 14 cs.; J. P. Heffernan Paper Co., 340 bls.; Gilbert Paper Co., 52 rolls and 169 bls.; R. F. Hammond, 14 bls. and 341 rolls; Arkell Safety Bag Co., 665 rolls; D. S. Walton & Co., 1,269 rolls; Martin Walsh, Inc., 107 rolls and 98 bls.; Blauvelt-Wiley Paper Mfg. Co., 36 bls.; C. K. MacAlpine & Co., 936 rolls and 69 bls.; Wilkinson Bros. & Co.,

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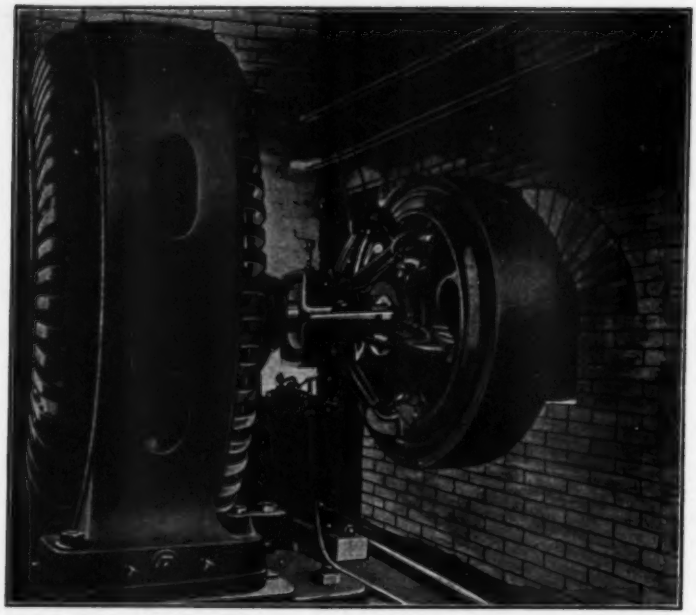

Read What This Man Said

After running our big No. 36 DD. "U.G." Friction clutch cut-off coupling 18 months:

"We have not had one minute's trouble with the clutch. No trouble whatever in picking up the load; does not pull the motor out of step, and so far is entirely satisfactory. We have not had to touch the adjusting bolts, in fact, have not adjusted anything about the clutch since it started."

Here is a No. 36 Double Disc "Universal Giant" Friction Clutch Cut-Off Coupling, the discs of which are fitted with our special "Non-Burn" Friction Lining.

The prime mover is a synchronous motor which is brought up to a speed of 200 R.P.M. before the clutch is thrown into engagement. The starting load varies from 700 to 800 H.P. and by slipping the clutch, this load is picked up without reducing the speed of the motor until the mill—a flour mill—is operating at capacity.

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285 bls. and 1,980 rolls; Mugler & Umlauff, 32 bls. and 264 rolls; Borregaard Co., 486 bls.; Brooklyn Standard Bag Co., 337 rolls; A. Baum & Co., 60 rolls; Steffen, Jones & Co., 82 rolls and 44 bls.; W. Hartmann & Co., 151 rolls and 13 bls.; Order, 1,193 bls. and 287 rolls.

Writing

Japan Paper Co., 14 cs.; Guibont, Freres & Co., 49 cs.; C. Steiner, 3 cs.; H. Lips, 2 cs.; F. L. Kraemer & Co., 7 cs.; American Shipping Co., 76 cs.; Order, 3 cs.

Drawing

H. Reeve Angel & Co., 6 cs.; Keuffel & Esser Co., 104 cs.; Globe Shipping Co., 8 cs.; E. Dietzgen & Co., 99 cs.; Art Importers Co., 16 cs.; G. W. Sheldon & Co., 6 cs.

Filter

E. Fougera & Co., 98 cs.; H. Reeve Angel & Co., 30 cs.; J. Manheimer, 54 bls.; A. Giese & Sons, 6 bls.

Tissue

F. C. Strype, 87 cs.; Iwai & Co., 2 cs.; R. F. Downing & Co., 12 cs.; F. L. Kraemer & Co., 3 cs.; Meadows, Wye & Co., 42 cs.; J. B. Mast & Co., 6 cs.

Photo

Gevaert Co. of America, 35 cs.; Defender Photo Supply Co., 1 cse.; Halced Co., 1 cse.; Globe Shipping Co., 345 cs.; F. Henjes, Jr., 97 cs.; P. C. Zuhlke, 237 cs.

Hanging

A. C. Dodman Jr. & Co., 98 bls. and 12 cs.; F. J. Emmerich & Co., 57 bls. and 118 pkgs.; W. H. S. Lloyd & Co., 128 cs. and 69 bls.; F. G. Prager & Co., 3,275 bls. and 655 rolls; National City Bank, 632 rolls and 875 bls.; R. F. Downing & Co., 7 cs.; Janeway & Carpenter, 58 rolls.

Board

Hensel, Bruckman & Lordbacher, 6 pkgs.; Metropolitan Import & Mfg. Co., 69 cs.; Phoenix Shipping Co., 15 cs.; A. Vuyck, 228 rolls; Buschmann Bros., 79 rolls; Draeger Shipping Co., 8 cs.; Larkin Co., 4 cs.; Flexideal Co., 81 cs.; Friedman & Co., 10 cs.; Maurice O'Meara Co., 60 pkgs.; C. B. Hewitt & Bros., 68 pkgs.; Wilkinson Bros. & Co., 44 bls.; Order, 159 rolls and 4 cs.

Miscellaneous

Whiting-Patterson Co., 51 cs. and 2 bls.; Dupont Cellophane Co., 88 cs.; Morrison Machine Co., 11 cs.; United Fruit Co., 30 bls.; C. W. Williams & Co., 7 cs.; Universal Edition, Inc., 18 cs.; Bank of Montreal, 14 cs.; Bernard, Judae & Co., 22 cs.; T. Nevin, 11 cs.; Independent Forwarding Co., 8 cs.; Gallagher & Ascher, 10 cs.; Judson Freight Forwarding Co., 44 cs.; C. H. Boulin, 48 cs.; J. J. Gavin & Co., 6 cs.; Coenca-Morrison Co., 10 cs.; Japan Paper Co., 149 cs.; Standard Products Corp., 7 cs.; A. Frankan & Co., 5 cs.; Hensel, Bruckman & Lorbacher, 5 cs.; P. H. Petry & Co., 76 cs.; Heemsoth, Basse & Co., 12 cs.; Zellerbach Paper Co., 8 cs.; S. Safier, Inc., 2,044 rolls; C. A. Johnson & Co., 48 bls.; Erstein & Co., 10 cs.; Birn & Wachenheim, 10 cs.; Borden & Riley Paper Co., 8 cs.; G. Joseph & Co., 136 rolls; American Shipping Co., 26 cs.; Union Bag & Paper Corp., 141 bdls.; Seaboard National Bank, 10 cs.; British-American Tobacco Co., 48 rolls.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 9766—Boxes, collapsible, from plain and corrugated fiber board. Cape Town, South Africa. Agency desired.

No. 9792—Card board, gray, several hundred tons. Montevideo, Uruguay. Purchase desired.

No. 9765—Paper napkins, towels, toilet paper, and paper specialties. Winnipeg, Canada. Purchase and agency desired.

No. 9725—Paper of all kinds, and stationery. Bombay, India. Agency desired.

No. 9912—Toilet paper. Hamburg, Germany. Purchase and agency desired.

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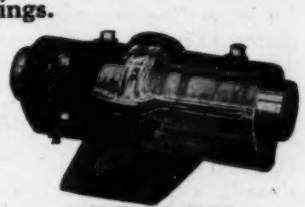
MILL EQUIPMENT

Years of Service at Full Efficiency —Not First Cost

Are Proof of the Merit of "Cleveland Type" Collar Oiling Bearings.



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Collar Oiling Bearing
(Pat'd.)

Forced oil circulation maintains an oil film under the revolving load and carries the shaft free from metal contact with the bearing. This anti-friction action is automatic and requires oil renewal only at long intervals.

These bearings are made in all sizes from $1\frac{7}{16}$" to 12" in diameter, and for any Ball and Socket or rigid mountings. Either kind have positive four way adjustment, a feature of great value and only found in the "Cleveland Type" Collar Oiling Bearing.

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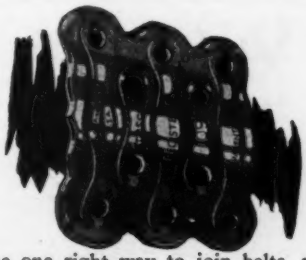

The one right way to join belts, and more men are being convinced of it every day, is the Crescent way. Crescent Belt Fasteners hold the belt with a vise-like grip. Curved—they hug the pulley and hold the power. No strain, slipping or stretching. They make each drive an endless source of power, smooth and frictionless. Crescent Belt Fasteners everywhere, in every industry are increasing the life of belts—a real belt insurance. An interesting Booklet is yours for the asking; write for it to the Crescent Belt Fastener Co., 247 Park Avenue, New York City.

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BELT FASTENERS

"Pulpwood and Wood Pulp in North America"

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An interesting and thorough description of the pulpwood industry—processes of making paper pulp from wood—the timber supply of North America—the need for increased timber production and future possibilities of the pulp and paper industry.

Detailed statistics of production and consumption since the establishment of the industry are given in the appendix and shown in the text by means of graphic charts of unusual effectiveness.

This book is of special interest to everyone connected with the pulp and paper industry. It points out clearly what must be done to develop sufficiently our supply of pulpwoods. It shows the steps necessary in forest conservation and discusses the subject from the practical viewpoint of industrial needs. 270 pages, 6x9; 87 illustrations.

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A practical handbook for paper mill chemists compiled by the Committee on Standard Methods for Testing Materials Used in the Paper Industry

The methods approved by the Committee and used in the leading paper mill laboratories include thirty of the materials in most general use. Among them are Alum, Bleach, Casein, Paper Fillers, Aniline Dyes, Pigment Colors, Glue, Lime, Rosin Size, Starch, and many others.

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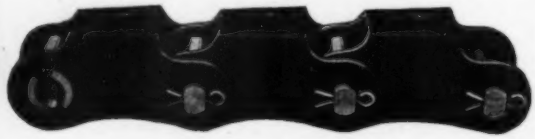

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THEY GIVE LONGER SERVICE PER UNIT OF COST

The bridged steel link insures strength and permanency. The large case-hardened pins and bushings, both reversible and renewable, insure durability and economy.

We can fill any of your requirements for elevators and conveyors, roller chains, bushing chains, attachment links, cast, cut, and renewable tooth sprockets.

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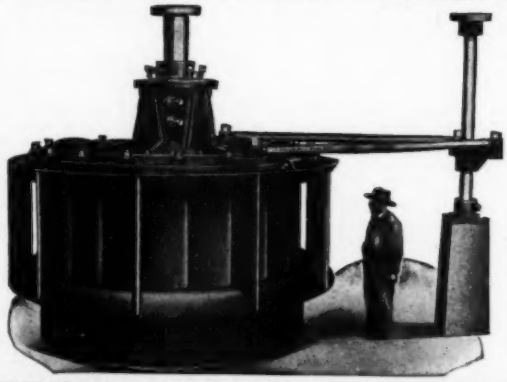

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All of our turbines are designed and built to suit location and requirements, by engineers and experts who have had years of experience in this particular line of work. Turbines fully guaranteed.

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No. 10016—Paper bags and wrapping paper. Havana, Cuba. Exclusive agency desired.
No. 10008—Paper products. Santo Domingo, Dominican Republic. Agency desired.

Stewards of a Great Trust

Speaking before the House Committee on Agriculture recently in support of legislation designed to conserve the forests of the United States, Mr. Willis C. Hawley, Congressman from Oregon, made a statement to which The American Forestry Association has called attention as a particularly pertinent public utterance. Mr. Hawley said:

"We are stewards of a great trust. We ourselves cannot create in this room any of the things that we enjoy. We did not write the Declaration of Independence or the Constitution of the United States; we did not fight the Revolutionary War; I imagine none in this room participated in the Civil War. We did not begin the educational systems or found the great universities. They were founded by a previous generation. I could enumerate, if time would permit, all of these things that have been given to us by generations that have gone.

"We are holding all these things in trust, including the natural resources of the country. They are ours to use economically and beneficially so far as our needs go. But we have no more right to destroy the forests of the country or to deplete them or injure them than we have to destroy the Constitution or the general system of public life or our educational institutions, and thus leave the next generation poverty-stricken in those things.

"Therefore, on the very broadest public policy that I can conceive of, we are obliged, as men of sense and wisdom, having some regard for the past and deep regard for the future, to use what of the public moneys it may be necessary to use to conserve these essential factors in the public welfare."

Manufacturers to Back Paper Simplification

Members of the American Paper and Pulp Association, by unanimous action, have voted to back "to the limit" and to make "effective in the shortest possible time" the simplification of paper to eight basic sizes and weights recommended by the Committee on Simplification of Paper Sizes, it was recently announced by William A. Durgin, chief of the Division of Simplified Practice, Department of Commerce. Mr. Durgin has been attending the convention of the Association in the interests of a simplification movement which has been under way since 1921, when it was first undertaken at the Bureau of Standards. Approximately 30 leaders in the industry were represented.

The National Advertisers Association reported at the meeting that within two weeks 189 or 280 members circularized in regard to the support of the basic paper sizes had pledged their aid, and that 250 would do so. More than 35 percent of the 300 members of the National Publishers Association, it was announced, had pledged their support to the program. Representatives of paper machinery manufacturers declared that that branch of the paper industry was in accord with any movement which would lessen the variety of paper machinery; while the National Paper Trade Association sent a report that it not only approved the basic sizes, but indorsed the present movement.

Mr. O. C. Radford has been appointed Manager of the Atlanta Branch of The Graton & Knight Mfg. Co., makers of Leather Belting and other Leather Products. Mr. Radford has been with this concern for several years and up to the time of his transfer to the Atlanta District was Branch Manager at New Orleans. Mr. M. J. Kennedy is to cover their South Carolina territory.

He has been with Graton & Knight for four years and has worked both at the main factory and at the Atlanta Branch for this company.

Irving A. Pfeil, of the Chicago office of the Blaw-Knox Company, has been appointed manager of the company's Detroit branch, succeeding Herbert J. Desson, who died recently. Mr. Pfeil graduated in civil engineering at Ohio Northern University. During the World War he served as lieutenant in the Aviation section. He has been with the Blaw-Knox Company since 1919.

MORSE SILENT CHAIN DRIVES

80 H. P. Morse Chain Drives from motors to beaters, 79" centers.

A Space Saving Drive for Paper Mills

Morse Chains transmit 98.6% power from steam engines, water wheels, and motors to paper machines, lineshafts, beaters, jordans, pumps, shaker screens, blowers, conveyors, and elevators in paper and pulp mills.

They deliver maximum power without vibration;—will not stretch, warp, or sway;—require no lacing or dressing;—allow motors to be brought up close to beaters;—can be operated efficiently over short centers, thus saving valuable space.

Morse Engineers will tell you of Morse advantages and help plan a successful, economical drive.

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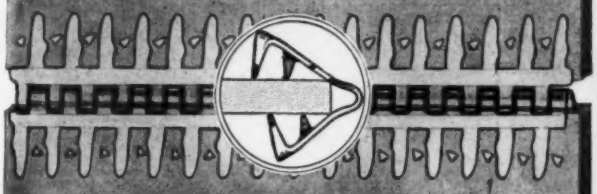
STEEL BELT LACING



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The sectional steel rocker hinge pins slip into the completed joint and are held in place by lugs. They rock back-to-back, making a practically frictionless bearing. Easily pushed out when necessary to lengthen or shorten belt. The strongest belt lacing on earth. "Only a Hammer to Apply It." Sold by leading wholesalers and retailers, the world over.

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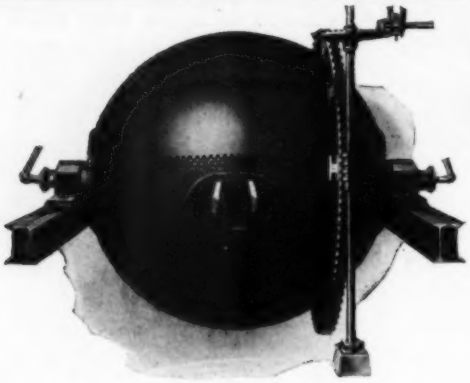

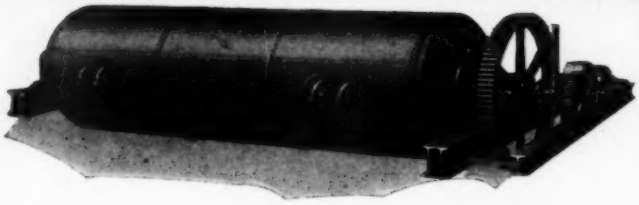

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